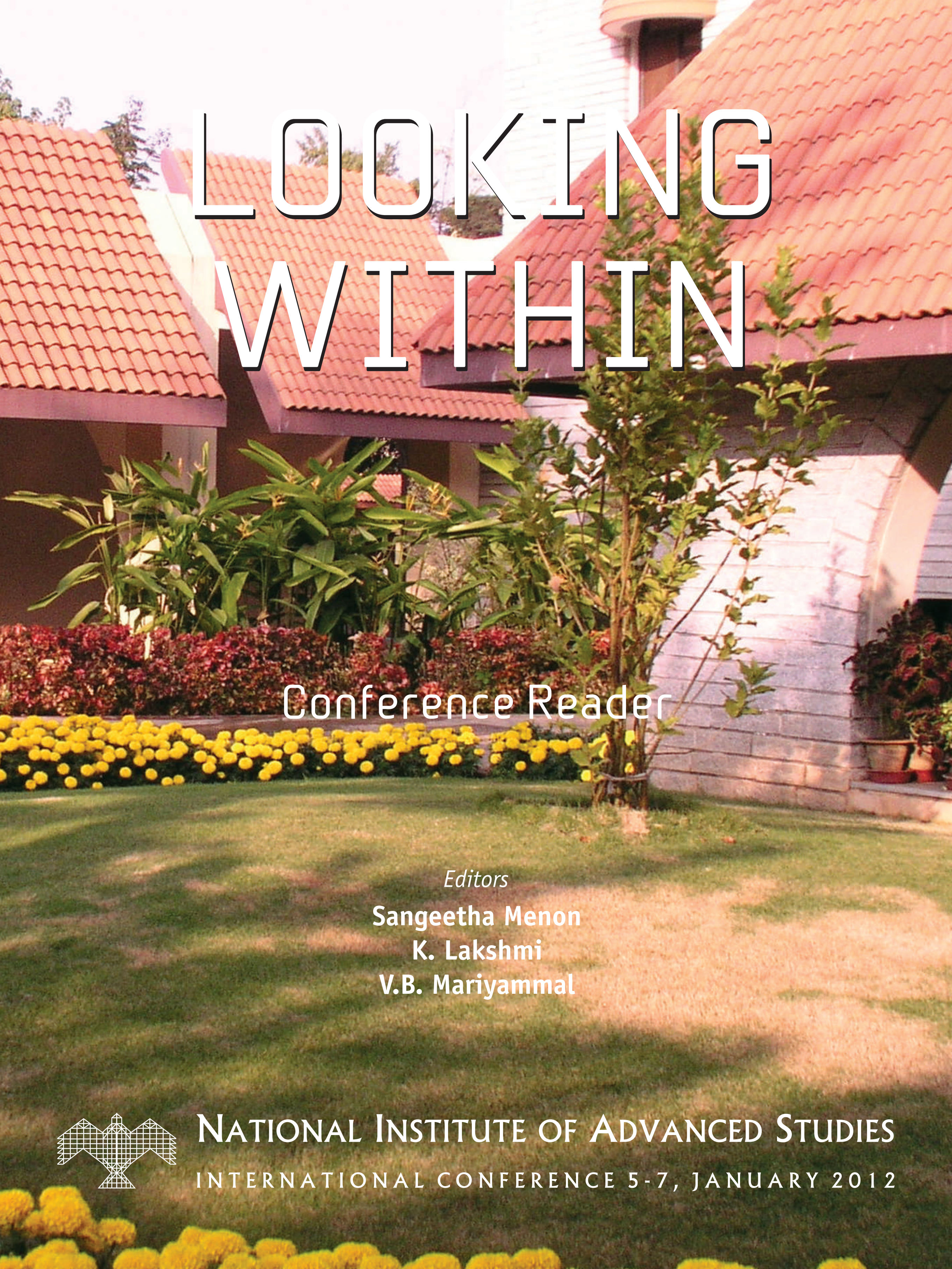


LOOKING WITHIN

Conference Reader

Editors

Sangeetha Menon
K. Lakshmi
V.B. Mariyammal

NATIONAL INSTITUTE OF ADVANCED STUDIES

INTERNATIONAL CONFERENCE 5-7, JANUARY 2012

Looking Within

Interdisciplinary Approaches to Consciousness

NIAS Consciousness Studies Programme
International Conference

5-7 January, 2012

Sponsored by

Department of Science and Technology, *Govt. of India*
Department of Biotechnology, *Govt. of India*
Department of Atomic Energy, *Govt. of India*
Indo-US Science and Technology Forum (IUSSTF)
Council of Scientific and Industrial Research, *Govt. of India*
Defence Research and Development Organisation, *Govt. of India*

Organized by

National Institute of Advanced Studies
Bangalore, India

Jointly with

Dr. Mani Bhaumik Educational Foundation, Kolkata

Table of Contents

Editors' Note

"Looking Within: Interdisciplinary Approaches to Consciousness" is the fifth Conference organized by the NIAS Consciousness Studies Programme. As in the past, for this Conference too, we were keen that the delegates of the Conference benefit as much as possible from interactions and discussions that will ensue during the three days. This Reader "Looking Within" is a result of that desire.

"Looking Within" is a pre-conference document with a collection of information pertaining to the Conference such as focal theme notes, lecture abstracts, poster abstracts, addresses, etc. that will help you to acquaint with the work and profile of fellow participants and speakers in advance. The Conference is attended by over hundred registered students, participants, invited speakers, and, represented by over sixty institutions from Canada, France, Germany, India, Japan, New Zealand, Poland, UK and USA.

We have taken utmost care to put together this Reader. We express our apologies in advance if any inadvertent error or omission is found. We present the Reader as a prelude to the Conference and invite your engagement for the deliberations during 5-7 January, 2012.

Wishing you a very happy new year.

Editors
Sangeetha Menon
K. Lakshmi
V.B. Mariyammal



Message from Director

National Institute of Advanced Studies, Bangalore

The subject of consciousness studies brings on one hand many disciplines together and, on the other, raises questions that are pertinent to understand the workings of our minds. In today's world one of the greatest challenges is to pool human potential in an effort to create global wellbeing. And for this we need to raise radical questions and delve into interdisciplinary areas of research on mind and consciousness. We need to bring in science, humanities, arts and social sciences together to understand and perhaps solve the final mystery of our times – human consciousness.

The Conference on "Looking Within" is a modest attempt to bring together people, disciplines and cultures to discuss and debate. I welcome you to the National Institute of Advanced Studies, and to this international conference "Looking Within: Interdisciplinary Approaches to Consciousness". I am sure with your participation and discussions that will take place during the three days, many areas of research will open up in Consciousness Studies.

With my best wishes for a successful conference,

V.S. Ramamurthy
4th January 2012

About National Institute of Advanced Studies (NIAS)

National Institute of Advanced Studies (NIAS) was conceived and founded in 1988 by the late Sri JRD Tata, who sought to create an institution to conduct advanced multidisciplinary research. Housed in a picturesque green campus in Bangalore the Institute serves as a forum to bring together individuals from diverse intellectual backgrounds. They include administrators and managers from industry and government, leaders in public affairs, eminent individuals in different walks of life, and the academicians in the natural and life sciences, humanities, and social sciences. The objective is to nurture a broad base of scholars, managers and leaders who would respond to the complex challenges that face contemporary India and global society, with insight, sensitivity, confidence and dedication.

NIAS was registered as a Society under the Karnataka Societies Registration Act, 1960 on 20th June 1988. The Council of Management, the Academic Council and the Holding Trustees are the three authorities responsible for overall administration of the Institute. Sri JRD Tata was the first Chairman of the Council of Management. Dr Raja Ramanna was the Founder Director until his retirement in July 1997, and followed by Prof R Narasimha until 2004. Dr K Kasturirangan was the Director during 2004-2009. Dr MS Swaminathan currently chairs the Council of Management. Prof VS Ramamurthy is the Director of the Institute.

The philosophy underlying NIAS is given shape by its research broadly in the areas of Humanities, Natural Sciences & Engineering, Social Sciences, and International Strategic & Security Studies. The Institute is unique in its integrated approach to the study of the intersections between science and technology, social issues, humanities and leadership. The research areas covered at NIAS are broadly in the field of social and political issues, education, gender issues, philosophy, psychology, science and society, environment, agriculture, materials heritage, art, archaeometallurgy, science atlas, nanotechnology, history, social anthropology, interdisciplinary economics, strategic, security and foreign policy issues, consciousness studies, primate behavioural ecology, cognition, genetics, conservation and mathematical modelling. Research studies conducted by the faculty of the Institute are disseminated through publications in peer-reviewed journals, edited volumes, books, Institute's reports and, lectures & technical seminars.

About Conference Supporters and Sponsors

DR. MANI BHAUMIK EDUCATIONAL FOUNDATION

Mani Lal Bhaumik is an Indian-born American physicist. He has been an author, lecturer, entrepreneur, and philanthropist. His early contributions to laser technology are exemplified by the development of the excimer laser at the Northrop Corporation Research and Technology Center in Los Angeles. Dr. Bhaumik utilized the earnings from his scientific career to seed various investments and was able to leave the poverty of his childhood behind. His life was chronicled on Lifestyles of the Rich and Famous. Later he discovered that spirituality is an essential ingredient for an abiding happiness and turned to the study of the relationship between advanced science and spirituality. His intensive search spanned a decade, produced a number of significant papers, and led him to the inference that the One Source at the hub of all spiritual traditions is grounded in scientific reality and not a mere creation of blind faith. He also argues forcefully that contrary to the popular misconception, science and spirituality are indeed two sides of the same coin, the coin being that unique human consciousness that allows us to perceive both ourselves and objective reality. Therefore, he argues in his book *Code Name God* (Crossroads Publishing), the big divide between science and spirituality can be bridged. The trick, Bhaumik asserts, is to see things in an entirely new light–a light shed upon by the recent revelations of quantum physics and cosmology. He now devotes much of his time and energy to bringing this message to the public, including its younger members, for whom he has recently published *The Cosmic Detective* (Penguin 2008), a primer on cosmology, and created an award winning animated television series, Quantum Ray, shown on the HUB channel, reaching 60 million homes in USA and distributed worldwide.

Dr. Bhaumik has instituted an annual International Award through the UCLA Neuropsychiatry Institute to acknowledge the best scientific evidence demonstrating the effect of mind in healing. He has been involved in numerous community activities through his association with the Los Angeles Bombay Sister City Association; the Los Angeles St. Petersburg Sister City association; the Long Beach Calcutta sister City Association and others. He has donated to various charitable organizations including the Thalians of Los Angeles.

But he is perhaps best known and revered internationally for his creation of the Bhaumik Educational Foundation, based in Calcutta, which provides full scholarships to needy but brilliant students who wish to apply themselves to studies in science and technology. The Foundation provides full financial support for university education of over one hundred highly meritorious but extremely underprivileged students from rural Bengal.

Dr Bhaumik's Foundation has made a very substantial donation to his Alma mater, Indian Institute of Technology, Kharagpur for establishing a world class Center at Kolkata for conducting cutting edge

research on Science and Technology. The Center will be built on 15 acres of land and will be called Dr. Mani Bhaumik International Center for Advanced Research, IIT-KGP at Kolkata.

DEPARTMENT OF SCIENCE AND TECHNOLOGY, GOI

Department of Science & Technology (DST) was established in May 1971, with the objective of promoting new areas of Science & Technology and to play the role of a nodal department for organising, coordinating and promoting S&T activities in the country. The Sponsorship to this international Conference has been made by the "Innovations Cluster (Cognitive Science) Scheme" of DST.
Souce: http://www.dst.gov.in

DEPARTMENT OF BIOTECHNOLOGY, GOI

The setting up of a separate Department of Biotechnology (DBT), under the Ministry of Science and Technology in 1986 gave a new impetus to the development of the field of modern biology and biotechnology in India. In more than a decade of its existence, the department has promoted and accelerated the pace of development of biotechnology in the country. Through several R&D projects, demonstrations and creation of infrastructural facilities a clear visible impact of this field has been seen. The department has made significant achievements in the growth and application of biotechnology in the broad areas of agriculture, health care, animal sciences, environment, and industry.

The impact of the biotechnology related developments in agriculture, health care, environment and industry, has already been visible and the efforts are now culminating into products and processes. More than 5000 research publications, 4000 post-doctoral students, several technologies transferred to industries and patents filed including US patents, can be considered as a modest beginning. Department of Biotechnology (DBT) has been interacting with more than 5,000 scientists per year in order to utilise the existing expertise of the universities and other national laboratories. A very strong peer reviewing and monitoring mechanism has been developed. There has been close interaction with the State Governments particularly through State S & T Councils for developing biotechnology application projects, demonstration of proven technologies, and training of human resource in States and Union Territories. Programmes with the states of Gujarat, Rajasthan, Madhya Pradesh, Orissa, West Bengal, Haryana, Punjab, Jammu & Kashmir, Mizoram, Andhra Pradesh and Uttar Pradesh have been evolved. Biotechnology Application Centres in Madhya Pradesh and West Bengal have already been started.

A unique feature of the department has been the deep involvement of the scientific community of the country through a number of technical task forces, advisory committees and individual experts in identification, formulation, implementation and monitoring of various programmes and activities.

In India, more than a decade of concerted effort in research and development in identified areas of modern biology and biotechnology have given rich dividends. The proven technologies at the laboratory level have been scaled up and demonstrated in field. Patenting of innovations, technology transfer to industries and close interaction with them have given a new direction to biotechnology research. Initiatives have been taken to promote transgenic research in plants with emphasis on pest and disease resistance, nutritional quality, silk-worm genome analysis, molecular biology of human genetic disorders, brain research, plant genome research, development, validation and commercialisation of diagnostic kits and vaccines for communicable diseases, food biotechnology, biodiversity conservation and bioprospecting, setting up of micropropagation parks and biotechnology based development for SC/ST, rural areas, women and for different States.

Necessary guidelines for transgenic plants, recombinant vaccines and drugs have also been evolved. A strong base of indigenous capabilities has been created. The field of biotechnology both for new innovations and applications would form a major research and commercial endeavor for socio-economic development in the next millennium.
Source: http://dbtindia.nic.in

INDO-U.S. SCIENCE AND TECHNOLOGY FORUM

The Indo-U.S. Science and Technology Forum (IUSSTF) was established in 2000 under an agreement between the Governments of India and United States of America with a mandate to promote, catalyze and seed bilateral collaboration in science, technology, engineering and biomedical research through substantive interaction amongst government, academia and industry. As its mandate, IUSSTF provides an enabling platform to the scientific enterprises of the two nations by supporting an S&T program portfolio that is expected to foster sustainable interactions with a potential to forge long term collaborations. IUSSTF program manifests are largely catalytic in nature that helps to create awareness through exchange and dissemination of information and opportunities in promoting bilateral scientific and technological cooperation.

IUSSTF has an evolving program portfolio that is largely conceived and driven by scientific communities of both the countries through extending support for symposia, workshops, conferences on topical and thematic areas of interest; visiting professorships and exchange programs; travel grants; fellowships; advanced training schools; public-private networked centres and knowledge R & D networked centres. IUSSTF also works towards nurturing contacts between young and mid career scientists by convening stimulating flagship events like the Frontiers of Science and Frontiers of Engineering symposium through the U.S. National Academies model. At the same time it reaches out to industries by partnering with business associations to generate high quality events on technology opportunities for business development to foster elements of innovation and enterprise through networking between academia and industry.

IUSSTF maintains a close working relationship with the federal agencies, laboratories, government institutions, and the academia in U.S. and India, cutting across all disciplines. IUSSTF has been entrusted to administer the bi-national US-India S&T Endowment Fund (for joint research and development, innovation, entrepreneurial and commercialization activities in S&T) and the Indo-US Joint Clean Energy Research and Development Center (to support multi-institutional network projects in clean energy using public-private partnership model of funding).

As an autonomous, not-for-profit society, IUSSTF has the ability, agility and flexibility to engage and involve industry, private R&D labs; and non governmental entities in its evolving activity manifold. This operational uniqueness allows the IUSSTF to receive grants and contributions from independent sources both in India and USA, besides the assured core funding from the two governments. IUSSTF solicits proposals for its activities thrice a year (January, May and September) and awards are made on the basis of peer reviews both in India and USA. IUSSTF values your interactions and looks forward to work with the S&T community of both countries to implement new ideas that endeavor to promote cutting edge Indo-U.S. Science and Technology collaborations.
Contact: INDO-U.S. SCIENCE AND TECHNOLOGY FORUM, Fulbright House, 12 Hailey Road, New Delhi 110 001, India, Website: www.indousstf.org

BOARD OF RESEARCH IN NUCLEAR SCIENCES, DEPT. OF ATOMIC ENERGY, GOI

The department of atomic energy (DAE) supports extramural research and development activities in nuclear and allied sciences, engineering and technology through its nodal funding agency - the Board of Research in Nuclear Sciences (BRNS). BRNS continuously thrives to encourage, enthuse and support scientists and engineers in pursuing excellence in R & D programmes of interest and relevance to DAE.
Source: http://www.barc.ernet.in/webpages/brns/brns1.html

COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

Council of Scientific & Industrial Research (CSIR), India, a premier national R&D organisation, is among the world's largest publicly funded R&D organisation. CSIR's pioneering sustained contribution to S&T human resource development is acclaimed nationally. Human Resource Development Group (HRDG), a division of CSIR realises this objective through various grants, fellowship schemes etc. Human Resource Development Group has been contributing significantly towards producing an inquiring society and fast growing knowledge economy. These numerous schemes cover a wide range of scientists (aging from 15 years to 65 years).
Source: http://www.csirhrdg.res.in/

DEFENCE RESEARCH & DEVELOPMENT ORGANISATION

Defence Research & Development Organisation (DRDO) works under Department of Defence Research and Development of Ministry of Defence. DRDO dedicatedly working towards enhancing self-reliance in Defence Systems and undertakes design & development leading to production of world class weapon systems and equipment in accordance with the expressed needs and the qualitative requirements laid down by the three services. DRDO is working in various areas of military technology which include aeronautics, armaments, combat vehicles, electronics, instrumentation engineering systems, missiles, materials, naval systems, advanced computing, simulation and life sciences. DRDO while striving to meet the Cutting edge weapons technology requirements provides ample spinoff benefits to the society at large thereby contributing to the nation building.
Source: http://drdo.gov.in

About NIAS Consciousness Studies Programme

Consciousness is the most vital and fundamental asset of human beings. It enables them not only to carry on day to day chores, but is also responsible for the greatest achievements of artists, scientists, technologists, literati and philosophers. Science, despite several hundreds of years of effort has not been able to find a satisfactory explanation regarding the mechanism of operation of consciousness, though it has identified the brain and its accessories, the neurons, as essential for this function. Over the last several decades, neuroscientists have made remarkable progress with the help of instruments to map out in detail the electro-physico-chemical phenomena taking place in the body responsible for some aspects of the consciousness phenomena. However, the same old 'mind-body' barrier – how exactly those electro-physico-chemical signals get transformed to sensations, feelings, thoughts, emotions etc., which fall into the subjective category of experience, remains unresolved.

In recent times, some of the leading quantum physicists have come up with the idea that the physical processes that go on in the neurons and the cortices of the brain may be quantum mechanical in character and the ideas of quantum fields, quantum coherences, etc., may have to be brought in to understand consciousness. The idea that in the final analysis matter, radiation, fields which are behind all the activity in the universe are themselves manifestations of the variety of hidden fields in the so called quantum vacuum and even a very familiar concept like 'mass' of a particle has to find its origin in the field of an exotic universal field like that of the Higgs Boson, suggest the possibility that a complex feature like consciousness may have a similar origin.

Today consciousness studies have implications in varied planes of human interactions questioning our fundamental assumptions about origins of life, nature of subjective experiences, and human wellbeing. A few centres in India have emerged in the last decade that focus primarily on cognition which is one of the many aspects of consciousness. There is a lacuna in the need to look at human experience and consciousness as a whole, and in the central context of Humanities. The *Consciousness Studies* programme at NIAS is a response to this lacuna. The programme has a larger framework, primarily qualitative, with interdisciplinary studies in neuropsychology, neurophilosophy and neurophysics.

The interest in consciousness studies, at NIAS, commenced with two eminent scholars joining NIAS in its initial years – Dr RL Kapur, a psychiatrist retired from NIMHANS; and Prof BV Sreekantan, a physicist and former Director of Tata Institute of Fundamental Research. They spearheaded a wide range of activities centred on topics and disciplines concerning consciousness such as mental health, creativity, quantum mechanics, Indian philosophy and neuropsychiatry. Subsequently, Sangeetha Menon and Anindya Sinha joined NIAS and started their work on consciousness and animal cognition and formed the 'Culture, Cognition and Consciousness' Unit. The very first national conference in India on scientific and philosophical studies on consciousness was organized at NIAS

in 1999. This was followed by many more national and international conferences all focusing on the interdisciplinary nature of consciousness. These conferences for the first time brought serious philosophers, psychologists, artists and scientists together to ask questions in an open but rigorous manner on consciousness and human self. NIAS published four books that resulted from these conferences. The conferences and the proceedings featured eminent scientists and scholars from the world: Charles Townes, Roger Penrose, Jane Goodall, Philip Clayton, R Balasubramaniam, and Mrinalini Sarabai, to name a few.

The current research objectives of the Programme are centred on issues of self, quantum oneness, and animal cognition & consciousness.

About the Conference

“Looking Within: Interdisciplinary approaches to Consciousness” is the fifth conference organized by the NIAS Consciousness Studies Programme. This Conference is inspired by our mandate to bring to discussion the challenging questions in the broad areas of consciousness covering neurophysics, animal cognition and self.

The Conference will focus on three Themes and dedicate one day each for the three Focal Themes. These Focus Themes are:

Neurophysics, Quantum Mechanics, Artificial Intelligence
Animal Consciousness and Cognitive Neuroscience
Self in Neuropsychiatry, Neurophenemenology and Neurophilosophy

Conference Focal Theme

Conference **DAY ONE**

5 January 2012: Neurophysics, Quantum Mechanics, Consciousness
Lead and Concept note: BV Sreekantan

Considerable progress has been made over the past few decades in delineating in enormous detail the physio-chemical processes going on in the brain and its accessories, the neural networks and sensors through the use of laser and tomographic techniques. While these have helped the neuro surgeons, the neurophysicians and the psychologists in treating more effectively the brain disorders compared to older days, it is fair to say that the ontological and mechanistic aspects of consciousness remain far from a satisfactory explanation. The so-called “hard problem” remains as hard as ever. Towards a solution of this problem new lines of approach based on the applications of the current theoretical ideas on quantum processes, quantum entanglement, quantum coherence, quantum vacuum and its manifestations have come into vogue and are receiving serious attention. Information theories have also been evoked; new lines of experimental investigation are also proposed and are in progress.

Conference **DAY TWO**

6 January 2012: Animal Consciousness and Cognitive Neuroscience
Lead and Concept note: Anindya Sinha

Empirical and observational studies of animal cognition will truly benefit if different behavioural manifestations of higher cognitive processes can be defined functionally. This is vitally important

because, when studying animals, cognition has to necessarily manifest in behaviour for it to be tractable, and the performance of such behaviour, in turn, needs to be unambiguously ascribed to an effect of particular cognitive processes. One theoretical framework to investigate cognition in animals in terms of mentalistic notions is that of the intentional stance, which assumes that each individual is an intentional system capable of mental states like beliefs, desires and emotions. To attribute such mental states to both oneself and to others is to have what has been termed a theory of mind. Social animals appear to be knowledgeable about one another's behaviour to different extents. But do they know as much about one another's beliefs and intentions? Are they adept at recognising the similarities and differences between their own and others' states of mind? Behavioural decision-making processes need to be analysed carefully in order to ascertain whether true higher-order intentionality can indeed be invoked as underlying mechanisms governing these acts. The alternative perspective of distributed cognition, however, disregards the ability of an individual to have observationally invisible mental states and only recognises communicative interactions and the behavioural dynamics within the entire group as manifestation of the socio-cognitive complexity that individuals are alone capable of displaying. We hope to explore some of these theoretical and philosophical issues in animal cognitive psychology, ranging from mental representation to distributed cognition, ultimately leading to our understanding of the current status of animal consciousness, during this meeting.

Conference **DAY THREE**

7 January 2012: Self in Neuropsychiatry, Neurophenomenology and Neurophilosophy
Lead and Concept note: Sangeetha Menon

A theme that runs through the major discussions in neuropsychiatry, neurophenomenology and neurophilosophy is the place, nature, and origin of self. The theories and debates on self have moved from an abstract object to a living subject whose personhood is challenged and framed by neural disposition. Neural disorders that change self-perceptions indicate how delicate the thin neural divide between normalcy and disorder is. It is also exciting that the challenge is not one way, but two ways. The subjective self through her experiences, values, attitudes and self-perceptions can alter or influence neural changes to bring in qualitative progress in life. In a way, the brain challenges the self, and the self challenges the brain. The renewed interest in values of antiquity such as empathy and compassion, and their biological foundations in mirror neurons invite us to think about the phasing out stark divisions between 'me' and the 'other', and to include more of the 'other' in 'me'. This would also bring in studies in cultural neuroscience, social emotions, and autism. Another important topic of interest in contemporary brain research is the concept of body itself. Brain is a continuously map-making mechanism. Our brains allow us to extend our self from just the arm's length, to the tool we hold, to the person we relate to, to the world we extend to. Our peripersonal spaces show intriguing neural formulations that underlie personal identities and body perceptions. An enquiry into the self and its relation with consciousness is one of the most exciting topics today, given the varied studies we do in neuropsychiatry, neurophenomenology, neurophilosophy and cultural neuroscience.

Conference International Advisory Committee

Chairman
Mani L Bhaumik, MBEF, Kolkata

Members
Max Velmans, University of London, UK
Jonathan Shear, Virginia Commonwealth University, US
Philip Clayton, Claremont Graduate University, US
R Narasimha, JNCASR, Bangalore
K Ramakrishna Rao, ICPR, Delhi

Conference National Organizing Committee

Chairperson
Sangeetha Menon, NIAS

Members
B V Sreekantan, NIAS
Anindya Sinha, NIAS
Vijayalakshmi Ravindranath, Centre for Neuroscience, IISc
Rajesh Kasturirangan, NIAS
S Ranganathan, NIAS
Sharada Srinivasan, NIAS
M G Narasimhan, NIAS

Conference Co-organizer

Dr. Mani Bhaumik Educational Foundation, *Kolkata*

Conference Sponsors

Department of Science and Technology, *Govt. of India*
Department of Biotechnology, *Govt. of India*
Department of Atomic Energy, *Govt. of India*
Indo-US Science and Technology Forum (IUSSTF)
Council of Scientific and Industrial Research, *Govt. of India*
Defence Research and Development Organisation, *Govt. of India*

Institutional Representation and the Audience

The Conference will have over hundred registered participants attending the sessions, and about thirty Poster presentations. There will be over twenty invited lectures, and three panel discussions. The invited speakers for the conference represent various institutions and countries from all over the world.

Institutions Represented by Invited Speakers

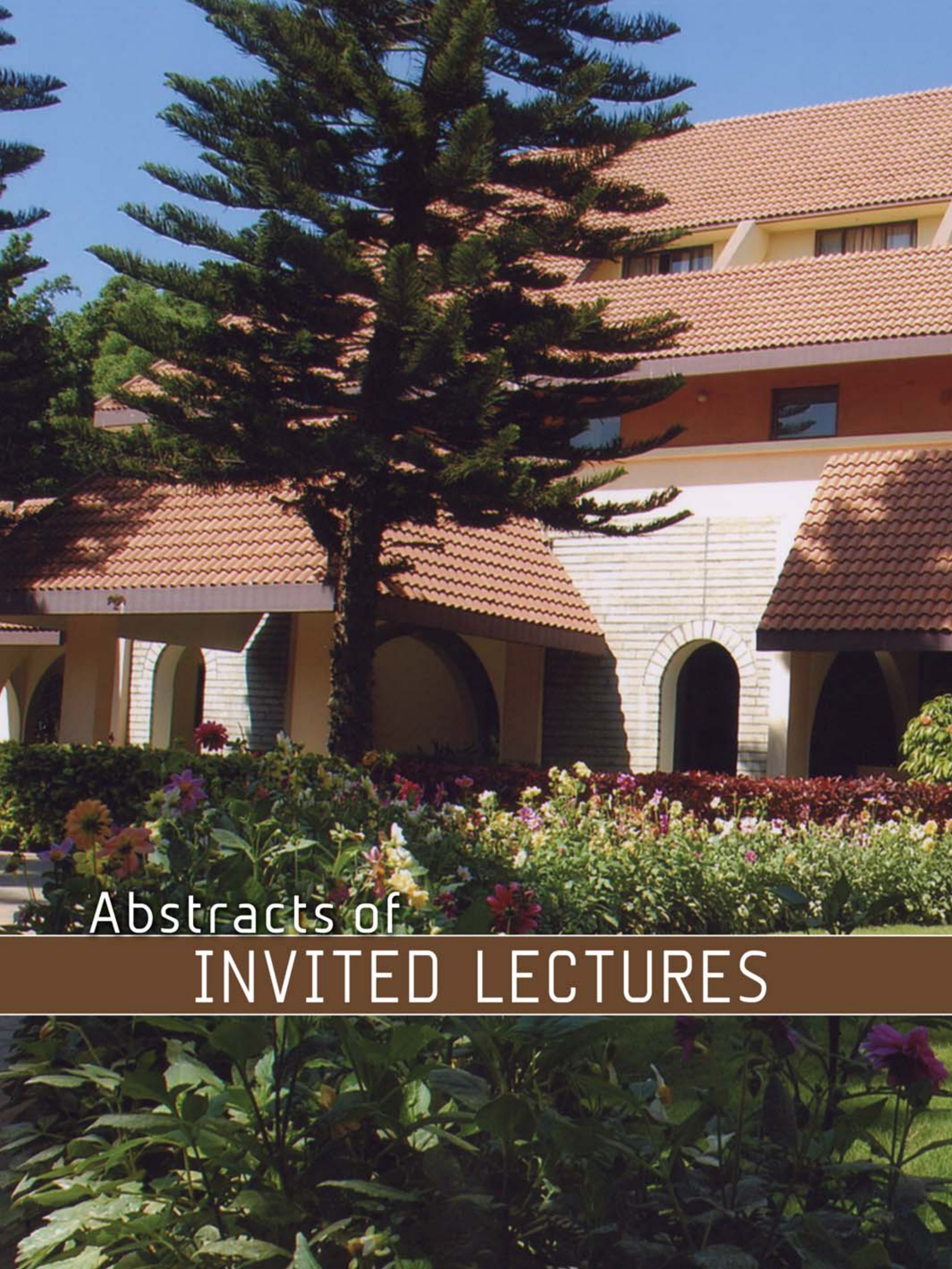
Banaras Hindu University, Varanasi, INDIA
Claremont Lincoln University, USA
Emory University, Atlanta, USA
Indian Institute of Science, Bangalore, INDIA
Indian Institute of Science Education and Research, Pune, INDIA
Indian Statistical Institute, Kolkata, INDIA
Kyoto University, Aichi, JAPAN
Max Planck Institute for Evolutionary Anthropology, Leipzig, Sachsen, GERMANY
National Institute of Advanced Studies (NIAS), Bangalore, INDIA
National Institute of Mental Health and Neurosciences (NIMHANS), Bangalore, INDIA
Poornaprajna Institute of Scientific Research, Bangalore, INDIA
Simon Fraser University, CANADA
University of Arizona, Tuscon,. Arizona, USA
University of Calcutta, Kolkata, INDIA
University of California, Los Angeles, USA
University of London, London, UK
University of Rouen, FRANCE
University of Sussex, Brighton, UK
Virginia Commonwealth University, Richmond, USA
Washington University, St. Louis, USA
World Association of Social Psychiatry (WASP)

Institutions Represented by Registered Participants

Cornell University, New York, USA
Edinburgh Napier University, Edinburgh, SCOTLAND
J. Kelper Institute of Astronomy, POLAND
Ministry of Education-Special Education, NEW ZEALAND
Primate Research Institute, Kyoto, JAPAN
University of Edinburgh, SCOTLAND
University of Toronto, CANADA

Amity University, Jaipur, INDIA
Amity University, Noida, INDIA
APL Global School, Chennai, INDIA

Asha Foundation, Bangalore, INDIA
Banaras Hindu University, Varanasi, INDIA
Blind People's Association, Ahmedabad, INDIA
CMR Centre for Management Studies, Bangalore, INDIA
Cochin University of Science and Technology, Thrissur, INDIA
Current Science Association, Bangalore, INDIA
Dayalbagh Educational Institute, Agra, INDIA
Girindra Sekhar Institute of Psychological Education and Research, Kolkata, INDIA
GROUP DYNAMIX Management Training & Organisation Development, Kolkata, INDIA
Hindustan College of Science and Technology, Mathura, INDIA
Human Dynamic Centre, Bangalore, INDIA
Indian Institute of Astrophysics, Bangalore, INDIA
Indian Institute of Science Education and Research, Kolkata, INDIA
Indian Institute of Science, Bangalore, INDIA
Institute of Distance Education, Madras University, INDIA
Jain University, Bangalore, INDIA
Jawaharlal Nehru University, New Delhi, INDIA
Karnataka Government Secretariat, Karnataka, INDIA
Kerala Forest Research Institute, Thrissur, Kerala, INDIA
Madras Christian College, Chennai, INDIA
Mahatma Gandhi Mission College of Engineering and Technology, Virat, INDIA
Mallya Aditi International School, Bangalore, INDIA
MGM College of Engineering and Technology, Navi Mumbai, INDIA
MS University, Baroda, Gujarat, INDIA
National Brain Research Centre (NBRC), Manesar, Gurgaon, INDIA
National Degree College, Bangalore, INDIA
National Institute of Advanced Studies (NIAS), Bangalore, INDIA
National Institute of Mental Health and Neurosciences, Bangalore, INDIA
Netaji Subhas Institute of Technology, Delhi University, Delhi, INDIA
Punjabi University, Patiala, INDIA
Regional Institute of Education, Mysore, INDIA
Richmond Fellowship P. G. College for Psychological Rehabilitation, Bangalore, INDIA
Sri Siddhartha Medical College, Tumkur, INDIA
Swami Vivekananda Yoga Anusandhana Samsthana (SVYASA), Bangalore, INDIA
Symbiosis Centre of Distance Learning, Pune, INDIA
Tata Institute of Fundamental Research, Mumbai, INDIA
University of Allahabad, INDIA
University of Calicut, Kerala, INDIA
University of Delhi, INDIA
West Bengal State University, Kolkata, INDIA



Abstracts of INVITED LECTURES

5TH JANUARY 2012

Focal Theme

NEUROPHYSICS, QUANTUM MECHANICS AND CONSCIOUSNESS

Mani **BHAUMIK**

Is the Source of Awareness Present in the Quantum Vacuum?

The phenomenon of awareness is common to all animate species. It is also at the core of cognition in any sentient being we consider capable of possessing consciousness. Consciousness is the very window through which we perceive reality and reflect upon the emotions and feelings that color our lives. It is also the vehicle through which we acquire our prized scientific knowledge. Because it is both an *instrument* of perception and a *perceived entity* itself, consciousness is qualitatively very different from anything else we know, and as such could be a fundamental feature of the universe. Considerable progress has been made in recent times, particularly through neuroscience, in understanding how consciousness operates in terms of brain activity. We can see which areas of the brain "light up" when we explore a math problem and which light up when we see a pretty face. These studies tend to regard consciousness to be a result of neural correlates. But the so called "hard problem" of consciousness stems from the fact that we have no clue as to how these neural correlates give rise to what we call *experience*.

Quantum field theory has now made a phenomenal step forward, bringing to us the stunning discovery that the primary source of everything in this universe is present in each element of spacetime. What was once thought to be sterile, desolate empty space is now known as the quantum vacuum, teeming with acts of creation and annihilation, and harboring the source of everything tangible throughout the universe. In light of this discovery, and the accompanying realization that quantum systems seem to exhibit behavior akin to self-awareness, it is suggestive to explore whether or not the source of our human awareness could also be present in the quantum vacuum. Quantum physics has compelled us to accept that two distinct and seemingly contradictory elements of reality can coexist in a complementary way. This represents not merely a paradigm shift in science, but a paradigm shift in thought, and paves the way for us to consider the possibility that the "immaterial" source of what we call consciousness could be entwined with the quantum fields that are the source of everything physical.

We know from experimental evidence that the quantum fields are continuously seething with activity that is completely spontaneous and unpredictable. The fields fluctuate with mind-boggling speed of a typical time period of 10^-22 second or less. Yet the fields have remained, on an average, *exactly* the same since the beginning of time, while all else in the universe has changed drastically. Does it not suggest the existence of some sort of self-referral mechanism that is responsible for maintaining the fidelity of the quantum fields in spite of their immense dynamism of spontaneous and unpredictable nature? The attribute of self-referral or self recognition, which is the hallmark of awareness, is an inherent feature of the strongly self-interacting dynamics of the non-Abelian fields. For example, the non-Abelian gluon field strongly responds to its own presence. Furthermore, the non-Abelian feature of the fields is more pronounced at fundamentally shorter distances, where the unification of the fields is expected to occur. This self-referral effect may be imparted to practical dimensions by the expected coherence of the fluctuations.

Thus, it is credibly indicative that the source of all things physical as well as the attribute of awareness is present in the quantum vacuum in a complementary fashion throughout the universe. It then follows that this cosmic awareness would be the most likely origin of our own consciousness, perhaps through a process of resonance in our brains.

Benoy **CHAKRAVERTY**

Is Brain in a Coherent State?

Bose Condensation occurs in a variety of physical systems; from dense neutron stars where it happens supposedly at million degrees Kelvin to atomic traps with dilute condensed alkali gases at nanokelvin temperatures passing through liquid He^4 and High temperature Superconductors. It has been suggested that this also happens in human brain. I would like to point out that our brain may well be in a coherent superfluid state, not necessarily Bose condensed.

I will treat our mind that neurons encompass as an abstract Hilbert space. it is an information space whose central function is gathering meaningful information and asking the organism to act on it. We postulate that a quantum of information is a bosonic quasiparticle that is created each time a neuronfires. Like any fundamental particle, the thought quanta must carry energy and momentum (a short video will be projected). An operator S^+, called cognition operator, also named *self* -operator will be defined to create such a quasiparticle. This S operator is nothing but an expression of our genetic identity. A phase coherent state of mind occurs whenever a macroscopic average $[S] \neq 0$ appears. At this point a phase transition occurs from an incoherent to a coherent state, defined by the cognitive order parameterΩ. The driving force behind this phase transition is not temperature but synaptic connectivity.

This is precisely the point where an I am emerges for each one of us ! I (or Ω) is the Ginzburg-Landau order parameter of the cognitive field.

Brain is an open system. Its basic physics and chemistry is characterised by dissipation and nonreversibility. This is why the sense of time present or passing is built into our consciousness. The Hamiltonian governing the dynamics can only be non-Hermitian. I will show the fundamental significance of such a Hamiltonian as far as our mind is concerned. I will also show how consciousness can be precisely defined as a response function, of the *S* - operators to the perturbation by the external world. What I am trying to develop is a simple language that would mean some-thing to both physicists and neuroscientists. Introducing the concept of self at the very basement level (bottom up) seems to me unavoidable if we are to understand self-organisation behind the cognition phenomenon.

Ramanath **COWSIK**

Cosmological Considerations Relevant to the Origin of Consciousness

Deep fundamental and primitive concepts like consciousness and life are very hard to define. It is even more difficult to fully comprehend their origins. Indeed, even in the essentially simpler systems that we study in Physics, the emergence of order poses great challenges, for, by and large, there is a natural tendency for systems to move from order to disorder. Or to state the idea more concisely in the language of Physics - entropy always tends to increase. Closely related to this is the concept of thermodynamic equilibrium, describing the tendency of systems to reach the same temperature as their surroundings, which is equivalent to saying that all the component microstates of the system adjust themselves into the most probable state, a state most often of the minimum energy. Life and many other aspects of nature display the exact opposite behavior, moving and evolving into systems of ever increasing order. Therein lies the conundrum.

These concepts pose a great challenge to the cosmologists who wish to understand the existence of matter in this big-bang universe: A straightforward calculation using the Saha-equation yields a matter (and anti-matter) density in the Universe that is only one billionth part of the observed density. Thus, the question of origin or origins of matter in the Universe is fraught with difficulties. The answer to this question was provided in the most elegant way by the Russian physicist, Sakharov. The second great challenge in Cosmology is the formation of organized structures like galaxies. A current understanding of this problem requires ideas ranging from Quantum Mechanics and to new postulates that extend the present understanding of particle physics.

The talk comprises three sections: 1) with the backdrop of the recent astronomical observation, the introduction poses these cosmological challenges in some detail; 2) a description of the

methodology adopted and the nature of the solutions to these problems; 3) and finally, an analysis of the relevance of these considerations to the question of the origin of consciousness, leading to conjectures and avenues for further study.

Stuart **HAMEROFF**

Consciousness and the Universe: Current Status of the Penrose-Hameroff Orch OR Theory

What is consciousness? Did consciousness emerge as an epiphenomenal byproduct of evolution, as modern science suggests? Or has consciousness been here all along, intrinsic to the universe, as Vedic and Eastern philosophies maintain? The Penrose-Hameroff theory of orchestrated objective reduction (Orch OR) accommodates both views, suggesting that 1) consciousness depends on synaptically 'orchestrated' quantum computations in intra-neuronal microtubules, regulating neuronal brain activity. 2) The quantum computations in microtubules evolve by the continuous Schrödinger equation and terminate in accordance with Penrose 'objective reduction' (OR) by E=h/t, where E is the magnitude of the quantum superposition, h is Planck's constant (over 2pi), and t is the time at which OR occurs (due to separation and instability in fundamental spacetime geometry). 3) Each Orch OR event results in a moment of conscious awareness, selecting proto-conscious qualities intrinsic to the most basic level of the universe. Consciousness is thus seen as a sequence of discrete moments (e.g. at 40 Hz, with t=25 msec, and E= nanograms of microtubule protein), each conscious moment a reconfiguration of underlying spacetime geometry, or quantum gravity. Orch OR thus suggests a connection between biomolecular processes in the brain and fine-grained structure and dynamics of the universe. First proposed in 1995, Orch OR has been repeatedly criticized on various grounds, for example whether quantum coherent states can occur in warm biological systems. In this presentation, Orch OR will be reviewed and updated in light of such criticisms, and new evidence supporting warm quantum biology. Finally, the nature of the Orch OR connection between neuronal processes and the universe will be explored through 1/f, scale-free, fractal-like aspects of brain structure and dynamics. Recent experiments have shown that brain network structure and temporal dynamics are, occasionally, self-similar, i.e. fractal, the same patterns repeating at different scales (content of consciousness and memory have long been considered fractal-like, or holographic). Using E=h/t, Orch OR (and thus consciousness) can occur at different neuronal network levels (EEG frequencies), and additional discrete levels extending downward in size, and upward in frequency and intensity, into specific levels of microtubule resonance (e.g. megahertz), and further still into quantum non-local fractal-like levels of spacetime geometry, possibly extending to Planck-scale spin networks and twistors. New evidence suggests fractal spiral pathways in microtubules supporting topological quantum computing. Consciousness (by E=h/t) can exist and transition among these various levels, consistent with Lokas or astral planes as described in Vedic writings.

Meditation and altered states may involve consciousness transitioning to higher frequencies and intensities in spacetime geometry in a fractal-like universe.

Reference:

Penrose R, Hameroff S (2011) Consciousness in the Universe: Neuroscience, Quantum Space-time Geometry and Orch OR Theory.
Journal of Cosmology 14. http://www.quantumconsciousness.org/Cosmology160.html

Mayank R **MEHTA**

Neurophysics of Consciousness

Consciousness has a range of descriptions and definitions, leaving plenty of room for debate. To make further progress, it would be useful to use a Neurophysical approach where we pick a specific aspect of consciousness and then experimentally measure, quantify and control consciousness, as well as generate a mathematically sound, biophysical theory that can explain the brain dynamics as a function of consciousness. While such neurophysical approach will not be all inclusive, and will not address all aspects of consciousness, it will provide a mechanistic understanding of the problem.

We spend a third of our lives sleeping, where we are largely unconscious. Thus, the depth of sleep could be used as one measure of (un)consciousness. Characterization of the change in brain dynamics as a function of depth of sleep, and the biophysical mechanisms that govern this dynamics, can provide quantitative insights about the mechanisms of consciousness. However, it is difficult to control the depth of sleep in a precise fashion. On the other hand, we are more likely to be conscious when we are walking or running, than while resting or sleeping. The running speed can be measured and controlled accurately. Hence, understanding the evolution of brain dynamics as a function of running speed can provide a temporally precise and an objective way of quantifying levels of consciousness. I will describe our experimental measurements of the changes in brain dynamics, and interactions between brain regions, as a function of depth of sleep and running speed. I will then describe a biophysical theory that could account for the experimental observations and thus provide an understanding of the underlying mechanisms. The results pave the way for a Hamiltonian formulation of brain dynamics of consciousness.

Shobini L **RAO**

Mirroring Advaita Vedanta with Cognitive Neuroscience

Cognitive Neuroscience with lesion studies and functional brain imaging has found that the human mental make up consists of sensory, motor, mnemonic, attentional, and regulatory,

emotional, volitional processes which are modular yet interdependent. Each of these processes are mediated by distinct functional brain networks. The functional networks are constellations of distinct brain structures connected spatially by anatomical connectivity or temporally through synchronous oscillations or both. These processes are dynamic in that they change with maturation, learning, practice and due to changing environmental demands. The change is enabled by brain plasticity. Capabilities of the brain for mediating the mind is determined by genes and environment. Vedanta has provided similar insights of modularity. Psyche or Manomaya kosha consists of Gyandendriya (5 senses), Karmendriya (4 organs of action – speech, limbs, excretion, procreation), Antahkarana consisting of Manas (mind), Buddhi (Intellect), Ahamkara (sense of agency). This constellation is Jada or inert as it requires a knower which is Chit or consciousness. The unchanging hence real and indivisible hence pervasive Chit has the characteristic of Truth (eternal order), Consciousness (self luminosity) and Bliss known as Sat Chit Ananda. Spiritual practices merely purify the mind. The pure manas reflects the chit yielding knowledge and bliss.

Cognitive Neuroscience has upheld the modularity of the mental makeup as explained in Vedanta. Distinct functional brain networks mediate the different sensory and motor functions. Emotions and Regulatory processes or executive functions with their modular brain networks may constitute the Manas or mind; Intelligence and Memory with their modular brain networks the Buddhi; Choice, Decision making, Volition, Sense of self with their modular brain networks the ahamkara. The Antahkarana which is distinct form the senses and motor functions consist of emotions, executive functions, intelligence, memory, Choice and decision making and sense of self. The big question is then where is the Chit which illumines this mental make up. The answer appears to be that attention and awareness are closest to Chit. Cognitive Psychology has shown that the functions of sensory perception, motor functions, memory, intelligence, emotions, executive functions, decision processes, are modified by attention. A base level of arousal, an essential component of attention is required to enable these functions. Attention to an object signifying contentful awareness is attained from infancy. This contentful awareness filled by attention is the default mental make up. Modular brain networks have been described for arousal, orienting and executive attention components of attention. Contentless awareness or pure awareness denoted by Vedanta as reflection of the Chit in the pure mind has not been located to any single brain structure or functional circuit. As Vedanta denotes meditation as a means for purification of the mind leading to the purified mind being able to reflect the everpresent Atman, the imaging studies of meditation are the beginning of this quest. Imaging studies of expert meditators have found increased of frontal theta power, increased gamma power and increased blood flow in the medial frontal and parietal areas being associated with different forms and depths of meditation.

To understand how the brain mediates this contentless awareness a paradigm shift appears to be necessary. The development of a paradigm which examines the integrated functioning of

the brain could be the means to understand how the brain mediates contentless awareness or enables the mind to reflect the atman.

Sisir **ROY**

Functional Geometry, Internal Representation and Consciousness

The proposal for a geometrical interpretation of brain function by Pellionisz and Llinas and further developed by Roy and Llinas help us to understand brain function in an integrated way. It was originally based on the assumption that the relationship between the brain and the external world is determined by the ability of the central nervous system (CNS) to construct an internal model of the world accomplished through the interactive relationship between sensory and motor expression. In this model the evolutionary realm provides the backbone for the development of an internal functional geometry. Almost a century before Mach investigated this issue in the context of the analysis of sensations and geometry. He emphasized at that time that without co-operation among sensory perceptions, in the sense of inductive reasoning, the understanding of a scientific geometry would be inconceivable. This is consistent with Indian geometry where inductive reasoning is the dominant approach (called sense dependent geometry) while in the more familiar Greek geometry pure "understanding" (deductive reasoning) dominates. The approach henceforth named tensor network theory is sufficiently rich to allow specific computational modeling and addressed the issue of prediction, based on Taylor series expansion properties of the system, at the neuronal level, as a basic property of brain function. It was actually proposed that the evolutionary realm is the backbone for the development of an internal functional space that, while being purely representational, can interact successfully with the totally different world of the so-called "external reality". Representationalism and realism have been widely discussed in Indian Philosophy including Buddhist framework.

This framework of functional geometry makes it possible to distinguish one individual from another. The forms or the patterns found in the external world are also associated with this internal geometry and is being modulated through the external stimulus. These forms are being carried at the time of birth may be by the genes. It has strong similarity with the thoughts of Dharmakirti in the context of "prama" and "pramana.

In this work I shall discuss the representations of the internal world and its connection to consciousness associated to functional geometry or sense dependent geometry. Then the epistemological issues will be analyzed and compared with those discussed in Indian Philosophy. The introduction of functional geometry raises a profound question whether functional geometry is necessary only for the description of the internal world or both internal and external world. The present author along with Ralph Abraham constructed a continuous space-

time geometry starting from a discrete evolving cellular network at the smallest level of the physical universe i.e. at the level of Planck scale. The imminent question is to find a relationship between the functional geometry associated to CNS and at the macroscopic level in the outside world. This will shed new light on the epistemological issues related to nature of consciousness and the validity of physical laws.

B V **SREEKANTAN**

Is “Vacuum Quantum Biology” the Future of Life Sciences?

As a result of remarkable developments in the field of Physics and Astrophysics over the last hundred years, “Vacuum Quantum Physics” hascome into the fore, emphasizing that what has been regarded as just empty space without any matter or radiation is not absolutely empty but is seething with the activities of quantum fields of fundamental particles and forces. All the matter and all the activities in the universe not only arise from the happenings in this “emptiness” but also are continuously sustained. One such field that is hogging, the headlines today is the “Higgs Boson field”. In search of the Higgs Boson an accelerator (LHC) costing 10 billion dollars has been constructed in Geneva. The importance of the Higgs field comes from the fact that the most familiar concept in our daily life, i.e. ‘mass’ is in reality a consequence of the interaction of the Higgs Field with the fields of other particles whose masses we measure and are familiar with. Without Higgs Field, there is no mass, there is no “us” andthere is no earth, no universe; only massless radiation fields!

The Higgs Field is also the one that gave rise to FORCE fields of different strength and different properties. Also for the masses to be sustained the Higgs Field has to be a Universal Field with the same strength everywhere.

If for understanding at a deep level a simple concept like ‘mass’, thus needs “Quantum Vacuum Physics” and a ten billion dollar accelerator to prove the theory does it not suggest that the resolution of profound problems like ‘life’ and ‘consciousness’ need sustained efforts at much deeper levels than what is being attempted at the present time just at the molecular levels? When the so called physical universe has all its ultimate secrets in quantum vacuum, and since biological problems are essentially considered as physico-chemical processes, perhaps it is necessary to examine whether there are new types of forces hidden in the vacuum which give rise to the phenomenon of consciousness through interactions with the cortical and neuronal structures of the brain and its accessories. Fortunately the quantum vacuum has provision for any number of new fields subject to certain laws. While Quantum Mechanics of field theories provide for the creation of new features, it is necessary that these are hidden in the vacuum. Quantum processes help to ferret them out.

R. **SRIKANTH**

Libertarian Free Will and Quantum Randomness

What exactly is free will (FW)? Does it exist? If yes, how can it be accommodated within the framework of the physical laws of Nature? These questions remain today with us since they were first asked at least over two thousand years ago by scientists, philosophers and theologians. We highlight logical paradoxes that make (libertarian) FW not easy to define, let alone to rigorously formulate and experimentally test. We resolve these paradoxes through a model of FW, in which it is proposed to be a novel causal primitive in Nature, in addition to determinism and indeterminism. We indicate how the notion of FW may be formalized meta-logically. Applied to quantum theory, our model implies that the exercise of FW should cause deviations from the Born rule. In principle, if not in obvious practice, these deviations would stand in conflict with both special relativity and (a physical variant of) the Strong Church-Turing thesis, implying that the brain may be an arena of exotic, non-standard physics. In this spirit, we propose possible neurobiological experimental tests of our proposed theory.

6TH JANUARY 2012

Focal Theme

ANIMAL COGNITION AND COGNITIVE NEUROSCIENCE

Ikuma **ADACHI**

Social recognition in Non-human Primates

Human cognitive activities are products of evolution as much as the body and social structure. Influential theoretical papers and empirical reports have hypothesized that the relatively sophisticated learning and cognitive abilities of primates have been selected for by virtue of their usefulness in the social domain. The comparative study of social cognition is therefore critical to advancing our understanding of the evolution of human cognitive abilities. Findings from field studies often suggest that animals have sophisticated recognition skills for social objects and events. However, many questions remain that require experimental approaches; for example, how do individuals garner information about their companions, and how do they store such information in memory? In my talk, I will introduce our recent experimental approaches on 1) their face perception and 2) their cross-modal representations in social domain.

S P **ARUN**

Can Computers Pass the Turing test for Vision?

If we truly understand intelligence, we should be able to create intelligent machines. But how would we confirm that we have created one? According to the famous Turing test, a computer that matches human performance can be considered intelligent. By this criteria, then, we have smart computers today that can play complex games like chess and even Jeopardy. So why don't we still have computers that can see the way we do? Why is vision so much harder for computers than playing chess? How does the brain accomplish vision and why does vision seem so effortless for us? These fundamental questions are important because studies of memory, cognition and even consciousness frequently are based on tests of visual perception. I will try to address these issues using studies on human vision, recordings from the monkey visual cortex and computer vision.

Josep **CALL**

Ape Metacognition: Challenges and Progress

Over the last two decades studies on metacognition have been playing an increasingly prominent role in the field of animal cognition. Confronted with uncertain or incomplete information in decision making situations monkeys and apes opt for either escaping the situation or seeking additional information. Although these responses are consistent with metacognition, currently there is some debate about their proper interpretation. In this talk I will review the evidence that has accumulated in the last decade in the so-called information seeking paradigm, which involves confronting subjects with two or more containers where food can be hidden. Researchers have manipulated several variables including the visibility of the baiting, the food type, and the amount of time elapsed since the baiting took place. To get the food, subjects have to select the baited container but before they do so, they can, if they wish, look inside the container to verify its contents. Although the initial results could be explained as a result of random search, response competition, or perceiving anxiety rather than monitoring memories, recent findings have in turn challenged each of these alternative explanations. Currently, information seeking in the great apes can be characterized as targeted (i.e., individuals do not search randomly), integrated (i.e., individuals can incorporate multiple types of information into their decision, including information derived by inference), and facultative (i.e., subjects can increase or decrease their searches depending on the information that they possess and the cost of searching and/or choosing wrongly). These findings, together with those from other metacognition paradigms, suggest that the great apes have some access to the causes of their uncertainty and they can flexibly deploy means to remedy this situation.

Robert R **HAMPTON**

Metacognition and Memory Systems in Primates

Metacognition is the monitoring and control of cognitive processing. Because metacognition can involve introspection in humans, it can be indicative of explicit, or declarative, cognition and memory. While metacognition is normally inferred from the ability of humans to verbally comment on mental processes, tests of metacognition appropriate for nonhumans have been successfully developed. I will describe the logic of these paradigms and some potential limitations of them. Studies of metacognition may provide a tool that allows us to discriminate between explicit and implicit cognition in nonhumans.

Malavika **KAPUR**

Consciousness, Memory and Dreams in Kashyapa Samhita

The presentation is on the three aspects of the mind as revealed in Kashyapa Samihta, an ancient paediatric treatise. Kashyapa Samhita deals with Kaumarabhratya: Care of the children, one of the eight branches of Ayurveda. The three aspects focused upon are:

i. Evolution of the mind in general and consciousness in particular during the foetal development.
ii. Memory as a function to be enhanced through treatments and as a repository of memory traces that spans generation.
iii. Dreams as the function of the mind, premonitory or otherwise.

The above three aspects shed light on the evolution of mind from childhood to adulthood as revealed in Kashyapa Samhita.

Rajesh **KASTURIRANGAN**

The Enselved Mind

We experience the world as an articulated whole; it is the rare person who can see the smile without the cheshire cat. The coherence and continuity of the experienced world is - in one form or another- the central problem of psychology and cognitive science. Linguists wonder how children acquire a full blown language from sparse data and perception researchers wonder how the visual system recovers three dimensional shape from two dimensional images. Cognitive scientists have tried to address the problem of coherence and continuity by postulating innate mental structures that make human beings and other animals to develop specialized modules for speaking and seeing. In other words, the particular manner in which we experience coherence and continuity is in our heads, not in the world. Recent work in embodied cognition suggests that the "mind-in-the-head" model is mistaken in at least two significant ways:

If coherence are continuity are in the mind, how is it that the mind hooks on to the world so nicely? Even if experience is mediated by representations, why are representations as good as they are?

Our minds are not as coherent as we think; when probed, individual experiences are far more impoverished than we think - sentences are broken and ungrammatical and perception is full of missing details.

If an earlier era of cognitive science asked the question "how is our experience of the world coherent and continuous despite poor sensory inputs?" we now ask "how is our experience of the world coherent and continuous despite poor internal representations?"

Embodied cognitive scientists explain the coherence and continuity in two ways:

- Our bodies provide continuity and coherence.
- The world provides continuity and coherence.

Unfortunately, there is a problem with this dyad, which hinges crucially on our understanding of the term body and world. If, by the term "body," we mean the material body as physicists would understand it, then the body cannot explain the normative and evaluative aspects of cognition and the qualia that accompany mental states. If "body" means something more than the physicists conception of a material body then we are back to the original problem: what is the living body and how does it organize our experience into a coherent and continuous whole? I believe that neither the material body nor the living body are the right explanatory frameworks for understanding the coherence and continuity of experience. The reliance on the body as an explanatory device is itself a relic of the mind-body divide that plagues western philosophy. It is not the body that structures experience, but rather, there is an entity that structures experience and is the precondition of experience of any kind at all, which can be identified with the self. Philosophers and scientists can disagree with each other about the ontological status of the self, but I believe that we have to accept that the self (not person, not body) is necessary for us to have the kind of experience we have. The self can be embodied in a particular manner in human beings but there is always the possibility that it is embodied in another organism or robot in some other manner. It is the structuring capacity that matters. I call this approach to the mind "The Enselved Mind."

Anil K **SETH**

Consciousness in Humans and other Animals

Understanding the neural basis of consciousness is a key challenge for 21st century science. Over the last 20 years, investigations into consciousness have broadened beyond philosophy and religion to encompass a broad array of the brain and behavioural sciences. A deeper understanding of the necessary and sufficient biological mechanisms underlying conscious experience will reframe humanity's concept of its place in nature, deliver revolutions in the clinical treatment of neurological and psychiatric disorders, generate major advances in engineering and AI harnessing the immense functional properties of consciousness, and compel redefinitions of basic ethical perspectives governing treatment of non-human animals.

In my talk, I will first describe one particular approach to 'consciousness science' based on the description and operationalization of so-called 'explanatory correlates' of consciousness. An explanatory correlate is a neural process that does not merely *correlate with* but actually *accounts for* corresponding properties of conscious phenomenology. I will illustrate this approach by describing a potential measure of conscious level based on conjoined functional integration and functional segregation as measured by 'causal density'. Recent results, based on application of causal density to high-density EEG data obtained during anesthesia, advertise the potential of this measure. I will then switch focus to cases where the existence of consciousness is controversial, taking as examples (i) brain-damaged patients in the vegetative state and (ii) non-human animals, in particular birds and cephalopods. I will describe the challenges involved in assessing consciousness in these cases, as well as steps towards their resolution.

Milind G **WATVE**

Is there Something Uniquely Human? Theory of Mind and Other Issues

Do human mental abilities differ qualitatively from those of other animals, or are the differences only quantitative? An answer to this question is yet to emerge. The main hurdle in answering the question is the different set of methods applied to study human behavior versus animal behavior. If any mental ability or behavioral characteristic is claimed to be uniquely human, one needs to make sure that it is not an illusion created by the different set of methods used. I will illustrate the effects of this potential thinking trap using theory of mind as an example. Theory of mind is the ability of assigning mental states to other individuals. In other words it is the ability to put oneself in someone else's shoes and think from that perspective. It is a long standing debate whether theory of mind is uniquely human. A number of experiments in primates and birds suggest theory of mind in animals but suffer from not being able to eliminate alternative interpretations. An attempt to remove the double standards and have a fresh look at the set of experiments suggests some novel possibilities.

7TH JANUARY 2012

Focal Theme
SELF IN NEUROPSYCHIATRY, NEUROPHENOMENOLOGY AND NEUROPHILOSOPHY

Gautam **CHATTERJEE**

Self as Creative Freedom in Kashmir Shaivism

The ever-creative spontaneous activity of consciousness is *Pratibha*, and Absolute freedom of will is *Svatantrya*. Hence we can make a clear notion about this term *Pratibha Svatantrya* (from Pratyabhijna system) by juxtaposing these two definitions. This is 'creative freedom' or Vimarsh in essence. Vimarsh is not contentless. It contains all that is to be. In creative freedom or flight, the self is in the state of Samanadhikaran. In this state, the Shiva sutra 'Nartaka Atma' reveals its meaning. We find that which is Anuttar inside, is the same Gyanganj outside. But these are only definitions, thought-constructs, not realization. Any Indian philosophical system comprises worship and realization, not a mere intellectual discourse with notions, so with the Kashmir Saivism.

Indian philosophy needs an Indian mind (the integral way of looking) that is devoid of conditioning and full of tranquility. With almost all philosophical, metaphysical or ontological terms, I find different approaches from different continents with different meanings though we all seek freedom, peace, love, happiness, salvation etc. We try to understand and contemplate over the technical terms but with different, rather contradictory perspectives, that's why non-Indian mind, today, usually fails to understand the Indian philosophical terms. Say, for example the term, consciousness. Any philosophy begins and eventually ends with this term 'consciousness'. We can easily categorize different perspectives, as western and Asian. So in order to understand this term *Pratibha Svatantrya,* we need to understand this oft-quoted and now most debatable term i.e. consciousness. For me, to look within means to look within consciousness which is ever and self-revealing. This is the essence of Shunyata in Buddhism. Then we have to understand hermeneutics. Today, act of reading an ancient text or exegesis is more important than the text itself. It requires a methodology which rests already within the text offered by the creator. This is an art of interpretation, called reception aesthetics. Hermeneutics sees *itihasa* as a constant mutual communication among past, present and future. It says, the text must be carried 'now'. So I propose, Abhinavagupta hermeneutics. We realize Pratibha Svatantrya in every moment of our daily lives. We have Buddhism in the background and Kashmir Saivism on the foreground. Vakyapadiya of sage Bhartrhari is the

missing link. We can easily correlate unmukha, pratimukha and abhimukha with vaikhari, madhyama and pashyanti respectively in the background of parikalpita, paritantra and parinispanna.

This is a playful state between the forms and the truth within. This is an immovable movement always present here and now. We need to realize the immanent face of consciousness smiles within the form or *abhasa*. Then there is an intentness (*unmukhata*) to move towards the transcendent face of the same consciousness. But *Pratibha Svatantrya* lies in between these two faces. This is love of beauty of a human being so that the evolution of mind comes into existence in no time and space with the sense of no-mind. This leads to self revelation. This is Pratyabhijna. The self is in realization as creative freedom.

Philip **CLAYTON**

Neurophenomenology as Key to the Emergent Self: How 'Spiritual' Experiences Augment the Neuroscientific Perspective

I will propose that "neurophenomenology" represents a key discipline for addressing the issues at our conference, "Looking Within: Interdisciplinary Approaches to Consciousness." This paper is therefore written for submission to the section of the conference entitled "Self in Neuropsychiatry, Neuorphenomenology and Neurophilosophy." In the paper I define neurophenomenology under three headings. I first consider some of the classical features of phenomenology, highlighting those that are especially relevant to this task. I then explore "boundaries issues" and unsolved questions in contemporary neuroscience, since neurophenomenology, if it is to be worthy of its name, must concentrate on these.

In the final section I use as a test case the spiritual experiences that arise across the world's religious traditions and outside of them as well. Here we consider reductive approaches such as those of V.S. Ramachandran (University of California, San Diego) on one side, and the overly ambitious claims of the so-called neurotheologians on the other. The ideal solution, I propose, is to analyze such experiences in a phenomenological fashion, that is, neither presupposing nor denying the real existence of their referent. The results help advance the neurosciences as well as the philosophy of religion, but they do not by themselves resolve the tensions that remain between these two fields.

Natalie **DEPRAZ**

What about a First Person Phenomenology? First steps towards an Experiential phenomenological Writing and Reading (EWR)

For most phenomenological philosophers such a question will appear pointless in virtue of its obviousness. What would be a phenomenological approach that would not be a first person one? Phenomenology is in the first person, or is not at all. Tautological proposition, taken-for-granted question: the answer is in the question, which is rhetorical. And what? Are we actually there? The obvious argumentation of the philosopher is the following: as soon as the transcendental I is mentioned, we have to do with a first person proper. Since Husserl's Phenomenology is exemplarily the science of a unique object, the subject, understood as the functional core of emergent lived experiences (which are to be experienced and described), phenomenology is ipso facto a first-person investigation.

I would like here to question such a common view. In order to do so, I will 1) put into question the equivalence between the "transcendental" and a first-person experiential instance. While refusing Emile Benvéniste's linguistic assertion, according to which "qui dit Je *est* Je", while claiming the necessity of a radical first-person experience (first contended by P. Vermersch), I will show that the only way to equate phenomenology and a radically first person approach is to demonstrate that Husserl's phenomenology is mostly a third person phenomenology. In order to contend such a view, I will examine a first accounts drawn from *Ideas* I, *Lectures about passive synthesis*, and from Sartre's *The transcendence of the ego* : sorting out the ambivalence of the phenomenological (here Husserlian and Sartrian) posture, its thrusts and limitations, I will be able to suggest a few experiential criteria of a first person phenomenology. My contention will be to explore the lived experience of the philosopher/phenomenologist while she or he is writing and Reading in order to experientially check her or his lived disposition: does she or he "see" what she or he reads? What she or he writes? How is she or he related to his concepts, arguments, descriptions, examples ? To what extend does she or he embodies her or his Writing and Reading ? Unfolding the first steps of my first person phenomenological approach: *Experiential Reading and Writing* (ERW) will give me the opportunity to share with the audience the experiential quality of our experiential embodiment, as phenomenological researchers.

Anand C **PARANJPE**

Finding the Self and Losing the Ego in the State of Pure Consciousness

While focusing on the boundary maintaining functions of the ego, I will first show how in the tradition of psychoanalytical ego psychology Paul Federn developed ways to help patients

in strengthening weak egos to avoid autism, depersonalization and other such forms of pathology. In the psychoanalytic tradition, the focus is on the boundary of the conscious ego with the unconscious id, and the focus is on the removal of pathology. Following Federn's lead, Erik Erikson explained how, in normal individuals, the boundaries of the ego keep constantly changing, while the unchanging foundation of selfhood in the true Self remains elusive. Like William James and Kant before him, Erikson postulated an unchanging transcendental center of awareness, but could not find ways of discovering the Self at that center. Turning then to Indian thought, I will show how the Katha Upanishad metaphorically conveys the idea of ego's boundaries. As the primordial "One" with unbounded pure consciousness split itself in countless centers of awareness, each center found itself trapped within the finite body of an individual organism. It then "poked holes" in the skin by way of sense organs for the purpose of communicating with the rest of the world. The Upanishad then suggests that, as a result of this development, ordinary consciousness normally remains directed outward. However, it says, some wise man, seeking the eternal, turned attention inward.

Indeed, many wise persons in the Indian tradition have developed different ways for transcending ego boundaries. Thus, in Patanjali's Yoga, one turns attention inward till it finally and firmly rests at the center of awareness. Here, the Self as subject (*drashta*) shrinks to a point form, and since a point has no dimensions there are no boundaries either, which means that the ego's boundaries are transcended. As Saint Tukaram says in one of his poems, he found – presumably in the state of Samadhi – that Tuka is tinier than the atom and bigger than the skies at the same time! As a result of such experience he not only finds enlightenment, but also sheds his ego, living the rest of his life for others. Similar results are obtained by following other paths to Self-realization. Thus, the Advaita system asks us to make a wise discrimination between the self and the non-self (*atma-anatma viveka*). The way to do so is through relentless critical self-examination (*manana*) in which the ego boundaries repeatedly attacked, recognized as cognitively constructed, and thereby rendered transparent and transcended. In BhaktiYoga, a similar result is obtained through total surrender of the ego at the feet of the Divine.

By and large, psychoanalysis, grounded in the medical model, tries to strengthen a week ego that is in danger of falling prey to the unruly wishes of the id. In contrast, the Indian spiritual traditions try to save strong egos from the dangers of egotism, greed and megalomania by training the ego to lose itself in the bliss of pure consciousness. Both serve different but equally desirable goals for persons in differing situations.

Nilanjana **SANYAL**

The Inside-Outside Story of Consciousness: A Phenomenological Reflection

Amidst the materialistic chaos of modernity, science has aspirations of offering the platters of calmness and serenity. The phenomenological wing of psychology tries to fathom the inner contents of self-consciousness to locate the patterns of its reflection in the outer fringes, so that attitudinal components in the forms of thoughts, feelings, desires and phantasy can attain some quality of balance to restore tranquility within. It studies consciousness or the natural course of experience that brings past into the present, opens up a space of possibilities from which choice makes a move to the future. But there is an inside and outside of consciousness. Reflection seems to retrieve the surface glare of consciousness, the pre-reflective ones form the inner most base. The sole experience of this consciousness is self. All the experiences are characterized by a quality of "mineness". The phenomenological approach serves as an indicator of evolution of self from pre-reflective to reflective state in the Dasein format of ontological development. The shift in the centre of gravity from consciousness (psychology) to existence (ontology), the subsequent direction of phenomenology has met an alteration making it at once both personal and mysterious. Phenomenologists offered a way to conceptualize experience that could accommodate those aspects of one's existence that lie on the periphery of sentient awareness.

Shridhar **SHARMA**

Identity and Culture

Identity is an umbrella term used throughout the social sciences to describe a person's conception and expression of individuality. Identity is also people's source of meaning. It is a developmental process occurring within the personality and has a powerful socio-cultural context within which it is formed. It refers to the capacity for self reflection and awareness of self. Identity is thus the entire personality of a human being in his uniqueness with psychological, biological and societal nature. Identity formation is a universal feature of human experience. In this respect, cultural domain of identity is known as ethnic identity. Till recently, the cultural identity was something people had as an undisturbed existential possession, in which there is an inheritance of continuity with the past. It is also important to state that 'self' is distinct from identity. From the vantage point of self psychology, there are two areas of interest: the process by which a self is formed (the 'I') and the cultural context of the schematic which compose the self concept (the 'me'). It is the process which defines individuals to others and themselves. Pieces of the entity's actual identity include a sense of continuity and a sense of uniqueness from others and a sense affiliation. The paper will address the concept of identity, identity formation in cultural context.

Jonathan **SHEAR**

Converging on the Self: Western Philosophy, Eastern Meditation, Scientific Research

Throughout much of its history questions about the nature of the self have been central to much of Western philosophy. Descartes, the "father" of modern Western philosophy, took knowledge of self to be the "Archimedes point" of all knowledge. Hume held it to be the "capital or center" of all the sciences. Kant argued that it is the "supreme principle of all employment of the understanding." But while they agreed about the importance of self-knowledge, their analyses of self conflicted starkly. Descartes argued that it has to be single, simple, unimaginable and continuing throughout all of one's experience. Hume looked within and declared that he found nothing at all corresponding to Descartes' description. Kant then strengthened *both* Descartes and Hume. He argued first, with Descartes, that self as single, simple, unimaginable and continuing is absolutely necessary. But then he argued, strengthening Hume, that the idea of self is *necessarily* empirically empty. This is because one's self has to be compatible with every experience one could ever have. As such it cannot have any empirical property of its own. (For if it did, it would be incompatible with otherwise logically possible experiences where that property was absent.) So self can only be "pure, original unchanging consciousness," devoid of empirical properties—something that we cannot even conceive of experiencing. The question of self has remained problematic for Western philosophy ever since.

Many Eastern philosophical traditions, by contrast, argue that while such an experience of pure qualityless consciousness cannot be *imagined*, it can actually be *had*. How? Through systematic meditation procedures that allow all ordinary mental activity to settle down and disappear while one nevertheless remains awake. What remains? Consciousness itself, devoid of empirical properties. Thus, as traditions as diverse as Yoga, Vedanta and Zen would emphasize, Kant was correct in his analysis of what self has to be: pure qualityless consciousness. But he was incorrect in concluding that we cannot have the experience. It can be had and remembered, even if it cannot be properly represented by empirical properties. This experience uniquely allows major features of Descartes, Hume and Kant's analyses of self to be rendered consistent, and their analyses in turn would appear to identify it as experience of self.

Several types of empirical research now appear to support this philosophical conclusion. Physiological correlates of the "pure consciousness" experience indicate that it reflects an innate, culture-independent potential of human consciousness experience (rather than a mere product of beliefs, wishful thinking and other culture-dependent variables). Correlations between meditation practices reported to produce this experience and unusually high activation of the default mode network (DMN) implicated in self-referential mental activity would suggest that the experience is strongly associated with our natural sense of self, all questions of

philosophy aside. And EEG considerations of relations between these practices and the spectra of effects they produce support the notion that the "pure consciousness" experience reflects something fundamental to human consciousness, if not consciousness itself.

Max **VELMANS**

Who's in Charge?

The concept of voluntary agency has been central to the free-will versus determinism debate and has in recent years become a topic of research. In this paper I explore the issues, viewed from the perspectives of philosophy and neuropsychology, focusing specifically on how conscious experiences could affect the workings of the brain. After reviewing some of the findings, I argue that consciousness/brain interactions can be understood via a form of compatibilism in which first-and third-person perspectives on the mind are treated as complementary and mutually irreducible. In order to understand who's in charge one also needs an expanded concept of the Self.



Abstracts of POSTERS

Proshanto Kr. **SAHA** &
Indramani L. **SINGH**
Cognitive Science Laboratory
Department of Psychology
Email: proshantocbcs@yahoo.com

BANARAS HINDU UNIVERSITY
Varanasi, India

Behavioural, Philosophical & Neurophysiological Approaches in Cognitive Control of Attention: Gateway to Consciousness

The phenomenon of attention describes discrete tasks such as selecting events among many similar or different events and, often extends to holding information for a period of time to respond according to potent need and goals. Mental processes, experiences and behaviour under a particular environment lead an individual to act in a specific pattern. To understand such complexity of actions we require different paradigms to unravel the intricacies. Among the major cognitive processes influencing or determining human actions-perception, attention, learning, memory and decision making-occupies prominent place. The information processing model prevalent in the cognitive psychology literature allowed many to recognize such systematic organization of human brain processing by framing human behaviour bit by bit. Such approach has often been a matter of debate whether being bottom-up process or top-down process. Still, the consensus is that goals often decide the behavioural processing. Looking into this, understanding basic behavioural processes became more accessible and error-free. The current approach is to bring together the behavioural findings, philosophical (indigenous schools of thought) overtures and neuroscientific methods for understanding the phenomenon of control of attention, imperative gateway to consciousness. Human behavior is not simply stimulus driven, but is also modulated by internal states. Internal control over behavior is usually referred in literature as executive control enables us to respond to the potent stimuli in a task and in a goal dependent way. A great number of separate and distinct functions have been attributed to control (or executive) processes, such as inhibition of pre-potent responses, initiation of behaviour, planning of action, hypothesis generation, cognitive flexibility, judgement and decision making and feedback management. Recent reviews on neuroimaging studies which have explored cerebral substrates of executive functioning seems to be either critical for method or some have demonstrated that different executive functions not only recruit various frontal areas but also depend upon posterior (mainly parietal) regions.

The current study unravels the task related human behavior based on arguments developed from schools of philosophy, corroborated by behavioural studies and some support from cognitive neuroscience. Essentially, for an efficient, coordinated performance on complex tasks often depends on the ability to switch from one task or task component to another.

Switching costs, increase in reaction time (RT) and error rates on the task after the switch, have been taken as an index of the control processes involved in reconfiguring and reconnecting various "modules" in the brain so as to perform the appropriate action with a given stimulus. The central question addressed by task switching research is how a task set, an effective organization of the cognitive system, is imposed to ensure that the appropriate task is performed. Thus the exploration of the processes underlying multiple task performance is considered under this plan of study while looking into the attention phenomenon more pronouncedly which might be helpful in determining the gateway to consciousness.

K. Jayashankar **REDDY**
Dept. of Psychology
Email: jayashankarblr@gmail.com
CMR CENTRE FOR MANAGEMENT STUDIES
Bangalore, India

The Ictal Consciousness in Patients with Focal Epilepsy

Epileptic seizures are characterized by a multifaceted spectrum of alterations in the general level of awareness and consciousness. Complete loss of consciousness occurs when epileptic activity involves both cortical and subcortical structures, as in generalized seizures. On the other hand, simple partial seizures can spare both the level and contents of consciousness. Using ictal neuropsychological examination in pre surgical patients with focal epilepsies, we examined the localizing value of the constituent functions of consciousness as opposed to 'conscious behaviour' as a unitary variable. The constituent functions of consciousness examined included the orientation to the examiner, intentional behaviour demonstrated by expressive or receptive speech, and postictal memory. Frequency and patterns of impairment of constituent functions and 'conscious behaviour' were assessed.

To study this, pre surgical Long Term Video EEG recordings (n = 40) of ictal neuropsychological assessments were reviewed retrospectively. Patients were divided into four groups with frontal (n = 10), right temporal (n = 10), left temporal (n = 10) and bitemporal (n = 10) seizure activity. There were different patterns of impairment of the assessed constituent functions in the four groups: patients with frontal seizure activity showed loss of orientation and expressive speech whereas patients with left temporal seizure activity had impairments of memory, expressive and receptive speech. Patients with seizure activity limited to the right temporal lobe rarely exhibited ictal impairment of any of the assessed functions. In contrast, patients with bitemporal seizure activity showed impairment of all examined functions. Hence, normal functioning of the left temporal lobe or both temporal lobes is necessary for the preservation of all constituent aspects of consciousness.

Sona **AHUJA**
Ranjeet Kaur **SATSANGI**
Department of Pedagogical Sciences
Faculty of Education
Email: ranjeetkaurdei@gmail.com

DAYALBAGH EDUCATIONAL INSTITUTE
Deemed University, Agra, India

A Correlational Analysis of Physical, Mental, Spiritual, Social and Self Consciousness

Consciousness refers to the totality of the impressions, thoughts, and feelings which make up the person's conscious being; perceiving the whole set of one's mental episodes. This constitutes (private) meta-self-awareness, because there is a perception of the totality, the whole set, and the perception is of internal events (impressions, thoughts, and feelings). Thus, by consciousness we mean our level of perception about ourselves and the world around us. The higher the perception, the greater the consciousness (Morin, 2004). Consciousness involves a recognition by the thinking subject of its own acts and affections; an awareness of an inward psychological fact; and/or intuitively perceiving knowledge of something in one's self (Natsoulas, 1978). Consciousness can be classified into six categories – physical, emotional, mental, spiritual, social and self consciousness. The present study is an attempt to find the intercorrelation between each of these two categories. The study has been conducted on 135 students of Faculty of Education, Dayalbagh Educational Institute. The tool 'Consciousness Quotient Inventory' developed by Bardazau (2011) was used to collect the required data. SPSS 16.0 was used to analyze bivariate correlation between the selected variables. The findings of corrrelational analysis reveal that – (i) there exists positive moderate correlation between mental and social consciousness; mental and self consciousness; spiritual and self consciousness, significant at 0.01 level. (ii) there exists positive low correlation between physical and emotional consciousness; emotional and mental consciousness; emotional and social consciousness; emotional and self consciousness; mental and spiritual consciousness; spiritual and social consciousness; social and self-consciousness; emotional and spiritual consciousness, significant at 0.01 level. (iii) physical and mental consciousness; physical and self-consciousness have insignificant positive negligible correlation (iv) physical and social consciousness are positively correlated and this low correlation is significant at 0.05 level It can be concluded from the findings that the inter-correlations between physical, emotional, mental, spiritual, social and self consciousness is not negative. Thus, with the increase in one of the categories of consciousness the other category increases. The moderate positive correlation between mental and social, mental and spiritual, spiritual and self consciousness indicates that inter-correlation between these categories is higher than the other categories which is either low or negligible.

K. Maharaj **KUMARI**
Vineeta **MATHUR**
Department of Chemistry
Faculty of Science
Email: vineetamathur2@gmail.com

DAYALBAGH EDUCATIONAL INSTITUTE
Agra, India

Neurochemical Activity of Serotinin: An Agent of Consciousness and Evolution

Developments in neuroscience have brought new insights into the subject of Consciousness which is associated in different ways with the alertness of the mind and with the awareness of the soul. Consciousness allows us to shut out irrelevant experiences and focus on the critical event that confronts us. States of ‘pure’ consciousness can be achieved by breaking the shackles of self through meditation. During meditation leading to higher consciousness, production of the neurochemical Serotonin in serum concentration has been observed to increase. Several studies have found an association between measures related to higher blood Serotonin levels better mood and behaviour. Neurotransmitters are chemicals which take a nerve signal across the synaptic gap between a sending neuron, and a receiving one. Neurochemically related changes may occur during meditation due to various other neurotransmitters such as Dopamine, Melatonin, Acetylcholine, GABA etc. Serotonin (5-hydroxytryptamine), a classic neurotransmitter is manufactured in the body using the amino acid tryptophan. Earlier studies draw a strong correlation of serotonin to animal evolution from the pre-Serotonin era to the post-serotonin era. In fact, some studies correlate the presence of Serotonin as a circulating factor of thermo-regulation, to be the turning point of Evolution between reptile species and warm-blooded animals. Further the phylogenetic comparison of primitive animals without circulating Serotonin and present day animals with circulating Serotonin has been used to make the molecular and quantum hypothesis of consciousness plausible. Therefore, different potential expressions for evolution of consciousness levels might occur, from quantum consciousness in the pre-Serotinin era to classic consciousness in the post-Serotonin era of circulating Serotinin. This suggests further evolution and a still higher expression of consciousness at the level of spiritual consciousness resulting from meditation in the era of higher blood Serotonin levels.

C.M.**MARKAN**
Vijay **KUMAR**
Dept. of Physics & Computer Science
SA Hospital
Email: cm.markan@dei.ac.in

DAYALBAGH EDUCATIONAL INSTITUTE
Agra, India

Evolution of Conscious States: A Developmental Proposition

Neural Synchrony as means to bind sensory features distributed over the cortical feature maps have been attracting interest in the studies of conscious perception. The need to build zero-lag synchrony across wide areas of the cortex has intrigued researchers and search for a possible correlate has brought forward several classical and quantum proposals which suggest role of electrical synapses for rapid back channel communication between neurons over large distances. Hebbian learning postulates that build hardwired synaptic neural assemblies based on correlated pre- and post-synaptic activity suggest that hardwired neural assemblies could develop through recurrent neural synchrony. This developmental preposition would ensure more and more complex cognitive tasks get hardwired and are performed under sub-conscious state permitting the conscious state or attentional concentration to be focused on more subtle cognitive tasks. It is proposed that the role of neural synchrony and selective attention is to systematically build hardwired neural assemblies for more and more complex cognitive tasks thereby driving the attentional concentration to higher cognitive areas related to subtle faculties so as to get in control of very regions that drive the human brain. This journey of attentional concentration through meditation could systematically lead us to apertures (cortical regions that map the ability to control the functionality of our cognitive capabilities) that may bring us in the realm of the Universal truth.

Gagandeep **NIGAM**
S **ASHA**
Email: gagandeepnigam@yahoo.com

DAYALBAGH EDUCATIONAL INSTITUTE
Agra, India

Search of Ultimate Reality through Intuition

This paper will be reflecting on the understanding of the concept of *Intuitive Consciousness*. The whole universe God made is based upon the phenomenon of intuitive consciousness. This will also describe the terms intuition and consciousness and effort is also made to understand the perception of individual based on the intuitive consciousness of self. It will

also come across to answer the questions viz; how does a mind relates to the brain? What do we mean by subjectivity and the self. This paper has also explained the intuitive consciousness based on broadly three stages took into consideration viz; *super consciousness, consciousness and subconsciousness*. With the help of examples and concepts given by the revered saints and scientists. This will also establish the relationship of intuition and consciousness on each other i.e. *Intuiton is commonly discussed in writings of spiritual thought. Contextually, there is often an idea of transcendent and more qualitative mind of one's spirit towards which a person strives or towards which consciousness evolves.*

A wise man should avoid lending his power of senses to promiscous observation and collection of varied impression and formation of indifferent ideas there from, in view to keep down irregular ,improper and unnecessary desires which spring up in the heart and prove a source of unlimited bother and trouble to the thinker. *Clear self consciousness* is a key to exist and carry on our duties fearlessly as it develops strong faith and love as it becomes more emotional aspect. Further *consciousness leads to honesty, sincerety, truthfulness, strong determination, zeal and will to expose ones' best.* It also adds to perseverance and humility to an individual personality. To be conscience increases one's concentration leaps and bounds on all the aspects life, material and spiritual. The result is progressive and positive. There is also an excellent success and achievement.

Sunita **SATSANGI**
Facilitator (DEI)
Email: sunitasatsangi1234@gmail.com

DAYALBAGH EDUCATIONAL INSTITUTE
Agra, India

Different Stages of Consciousness in Human Beings

Consciousness is a term that refers to a variety of aspects of the relationship between the mind and the world with which it interacts. It has been defined as: subjectivity; the ability to experience feelings; wakefulness; having a sense of selfhood; or the executive control system of the mind. In general consciousness means "awareness." Awareness regarding self improvement and self development. The aim of the study is to show the relationship between levels of consciousness, motivation and behavior and needs. There are different levels of consciousness in which we as individuals function. These levels determine the reason why people behave the way they do. Every human being in the world grows in consciousness in different stages there are seven stages of consciousness. These seven existential are the principal motivating forces in all human affairs.

The upper three levels of consciousness focus on our need to find meaning and purpose in our existence; actualising that meaning by making a difference in the world, and leading a life of self less service. Abraham Maslow referred to these as "growth" needs. When these needs are fulfilled they do not go away. They engender deeper levels of motivation and commitment. During this stage of our development, we increasingly develop the capacity to stand back and reflect on the strengths and limitations of our own ideology. We learn how to become our own self witness, and develop an inner compass that intuitively guides us into making life affirming decisions. Individuals that focus on the satisfaction of the lower needs, tend to live self centred, shallow lives. They are significantly influenced by the anxieties and fears they hold about satisfying their deficiency needs. Individuals that focus on the satisfaction of the higher needs tend to lack the skills necessary to remain grounded and operate effectively in the physical world. They can be ineffectual and impractical when it comes to taking care of their basic needs. The most successful individuals are those who balanced both their "deficiency" needs and their "growth" needs. They operate from Full Spectrum Consciousness. They are trusting of others, are able to manage complexity, and can respond or rapidly adapt to all situations. The successful mastery of each level of consciousness or stage of development involves two steps: first, becoming aware of the emergent need, and second developing the skills that are necessary to satisfy the need. Individuals that focus on the satisfaction of the higher needs tend to lack the skills necessary to remain grounded and operate effectively in the physical world. They can be ineffectual and impractical when it comes to taking care of their basic needs. The study explains the seven stages in development and growth of personal consciousness with their needs and satisfaction.

Neha **SHIVHARE**
Faculty of Education
Email: nehashivhare1@gmail.com

DAYALBAGH EDUCATIONAL INSTITUTE
Agra, India

Systems Approach to the Development of Science of Consciousness

Despite of all the technological advancements and abundant information available about the brain, we still need to discover ways for cultivating qualities of consciousness such as wisdom, compassion, love, happiness, kindness and feeling of oneness leading to contentment in life, better emotional, personal and social adjustment and ultimately to self realization. For this what we sorely need today is a comprehensive understanding of consciousness, entire creation and their inter-relation. This can be provided to us in the form of Science of Consciousness which can be defined as a systematic study of consciousness for understanding its various aspects. Science of Consciousness can enable indirect realization of the existence of Supreme

Reality, making a person contemplate and understand that he has a special purpose in life. Inspite, of its enormous significance, Science of Consciousness has not been properly developed as an independent academic discipline for imparting knowledge related to consciousness, creation, microcosm, macrocosm, etc. There can be a number of reasons behind this, but, it is high time and, now, Science of Consciousness should be properly developed and studied for a better future of humanity. But, this is not an easy task because since ancient times consciousness has been interpreted and understood by different people in different ways according to their level of understanding and knowledge. Western scientists, neuroscientists and western philosophers consider it as something materialistic or a result of some reaction.

On the other hand, various philosophers of different schools of philosophy (Oriental and Occidental) interpret consciousness using their own principles and metaphysical beliefs. Though, all philosophies lead to the same conclusion of existence of a Supreme Power (Consciousness) i.e. all advance towards the same destination of self realization, but, using their own point of views. Scientific experiments performed by neuro- scientists and others, inspite of being intrusive and invasive in mental functioning of the subjects of experiments, have provided grounds to believe that consciousness is as real as matter, space and time, although, it cannot be observed by our physical senses. Now coming to the theories and teachings of Saints, we find that saints not only of Indian origin but, also of foreign countries provide us with more substantial, logical and understandable uniform views about consciousness based on their spiritual experiences and observations. Since, they have activated their inner sense organs, they have the powers of observing the metaphysical world and based on their observations they can guide us rightly. The best part of saints' theory is that it can be co-related to scientific concepts and interpreted scientifically to provide proper bases for developing one's own faith in the concept of Supreme Consciousness and its omnipresence in the entire creation. Reflecting on the above discussion, this paper attempts to explain how Science of Consciousness can be developed using steps of Systems Approach by integrating the information of various fields viz. philosophical, sociological, psychological, neuro-scientific, cognitive, spiritual, etc. methodologically and systemically for better understanding and self experiencing human consciousness and Supreme Consciousness.

Prem Sewak **SUDHISH**
D. **SWANTI**
Email: sudhish@alumni.Stanford.edu
swanti@alumni.Stanford.edu

DAYALBAGH EDUCATIONAL INSTITUTE
Agra, India

Higher Type Fuzzy Sets and Consciousness Modeling

The thought of creating machines that would replicate human intelligence have been of interest both in fiction and to scientists and engineers. However, one of the challenges in such endeavors is to be able to build a suitable model for consciousness. Consciousness is considered to be related closely to intuition, intelligence and thought, which humans are able to express best through language than precise mathematical expressions. The science of replicating handling of real life ambiguous situations through computer models by providing flexible information processing capability is often called soft computing. The guiding principle in these methods is to devise computation that leads to an acceptable solution at a low cost by seeking an approximate solution to an imprecisely or precisely formulated problem. Soft computing exploits the tolerance for imprecision, uncertainty, partial truth, and approximation in order to achieve tractability and robustness in solutions to difficult real world problems. These techniques integrate advanced computing paradigms such as neural networks, fuzzy logic, rough set theory, chaos theory, probability theory, evolutionary computation, etc. Soft computing techniques have efficiently and effectively been applied to several real-world industrial, consumer and research applications.

In this paper, we present one such soft computing paradigm – fuzzy logic and consider the transition from ordinary crisp sets to fuzzy sets, where the membership of an element in a set is not necessarily 0 or 1. These fuzzy sets are useful in modeling the linguistic uncertainty in expression of human thought. However, even though an element may or may not fully belong to a set, the membership functions are specified exactly, which clearly seems counter–intuitive, since if the exact value of an uncertain quantity cannot be determined, it would also be impossible to determine its exact membership in a fuzzy set. This leads to the idea of type–2 fuzzy sets as an extension of the concept of classical type–1 fuzzy sets. Type–2 fuzzy sets are characterized by a fuzzy membership function, that is, the membership value or grade for each element of the set is a type–1 fuzzy set itself. It has been claimed that the uncertainties that cannot be modeled using classical fuzzy logic can be modeled using type–2 fuzzy logic.

While some results indicate that type–2 systems have the potential to provide better performance than type–1 systems and are, therefore, more useful for incorporating linguistic uncertainties, the basics of fuzzy logic do not change from type–1 to type–2 systems, except that the difference in output processing of type–2 systems requires the use of a type–reducer

to reduce the output fuzzy sets' degree, leading to a significant increase in computational complexity involved in their implementation. Measures of reducing this complexity include methods such as footprint of uncertainty which provide a useful verbal and graphical description of the uncertainty captured by any given type–2 set. Such efforts have particularly been concentrated on a restricted class of general type–2 fuzzy sets known as interval type-2 fuzzy sets that are characterized by having secondary membership functions which only take the values 0 or 1. However, the criticism applicable to type–1 systems also applies partially to type–2 systems. Even though the membership in type–2 systems is fuzzy, it is again specified exactly, which is also counter–intuitive. We conclude that no finite-type fuzzy set would completely be able to represent uncertainty and thus, a type-" fuzzy system would be needed for this purpose. It is shown that while higher type fuzzy sets may be better models for uncertainly, they would also lead to a tremendous increase in complexity. A type-" system would also have an infinite complexity and would therefore be non–computable.

Keywords- Fuzzy Logic, Fuzzy Type-2, Uncertaintly, Consciousness.

References

[1] SK Pal, and S Mitra, "Neuro-Fuzzy Pattern Recognition", Methods in Soft Computing. John Wiley and Sons, Inc, 1999.

[2] NN Karnik, and JMMendel, "Introduction to Type-2 Fuzzy Logic Systems", in proc 1998 IEEE FUZZ Conf., pp. 915-920, Anchorage, May, 1998.

[3] LA Zadeh, "The concept of a linguistic variable and its application to approximate reasoning," Information Sciences, vol. 8, no. 3, pp. 199-249, 1975.

[4] JM Mendel, "Uncertain rule-based fuzzy logic systems: Introduction and new directions", Prentice Hall, NJ, 2001.

[5] O Castillo and P Melin, "Intelligent systems with interval type-2 fuzzy logic," International Journal of Innovative Computing, Information and Control, vol. 4, no. 4, pp. 771-783, 2008.

[6] J. Mendel, "Advances in type-2 fuzzy sets and systems," Information Sciences, vol. 177, pp. 84-110, 2007.

[7] LA Zadeh, "Fuzzy Logic and its Application to Approximate Reasoning", *Information Processing*, 74:591–594, 1974.

[8] M Mizumoto and K Tanaka, "Some Properties of Fuzzy Sets of Type 2," *Information and Control*, Vol. 31, pp. 312-340, 1976.

[9] N Karnik, J Mendel, and Q. Liang, "Type-2 Fuzzy Logic Systems," *IEEE Trans. On Fuzzy Systems*, Vol. 7, No. 6, pp. 643-658, 1999.

[10] Q Liang and J Mendel, "Interval Type-2 Fuzzy Logic Systems: Theory and Design," *IEEE Trans. On Fuzzy Systems*, Vol. 8, No.5, pp. 535-550, 2000.

Sonali **MOHAPATRA**
Email: shine.shons@gmail.com

INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH
Kolkata, India

Simulation of Human Understanding of Predicates in Computers: Making the Computers Behave Like Humans

Human children have innate mechanisms which help them to grasp concepts and relationships (predicates like grandfather, father, cousin, above, below, beside) by example-based learning and simple observation. The role of the teaching in the early childhood seems important to the development of understanding and problem-solving skills in humans. The way a small child with absolutely no knowledge(or here, no database) and no recognition of things familiar to an adult is taught as well as grasps concepts is remarkable. But, as there are no such innate mechanisms in computers, in order to make them 'think' and 'behave' like humans and be a universal problem solver, we have to outline a method of learning first and make certain things innate to their system.

In this poster, I will discuss a working mechanism as to how human children might store data and form rules in their brain based on example-based learning and a similarity matching approach and I will try to use the same approach to teach computers simple predicate concepts. The aim is to arm computers with the skill to write programs based on any given database and solve problems to become a universal problem solver. Here, I will show a mechanism based on the above approach to enable computers to form rules based on databases (collection of facts) which is the first step towards writing a program(a collection of valid rules). SWI -PROLOG has been used to implement this scheme on a computer and we have managed to teach it the basic concepts of predicate logic and to use the concept of predicate expression in formation of rules.

M. Taraka **RAMJI**
Department of Biological Sciences
Email: moturu1103@iiserkol.ac.in

INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH
Kolkata, India

Understanding the Complexity of Perception and Correlation to Visual Pathways

Assigning of neural science is to understand how we act, perceive, remember and forget. Visual perception is the ability to analyze and interpret the information from the effects of

visible light reaching the eye. Two parallel pathways (M and P) originate in the retina and continue in two cortical processing pathways leading to posterior parietal and inferior temporal cortices. The ganglion cells in the retina project to the lateral geniculate nucleus in the thalamus which creates a complete retinotopic map of visual field for each eye in the nucleus. Within the striate cortex, information is distributed to other layers of cortical and sub cortical regions. Information thus flows in two directions: between the layers and horizontally throughout each layer. The visual pathway being a complex can be analyzed using the graph theory. The graph theory explains the complexity of visual pathway by defining the network nodes, continuous association between the nodes. This generates an association matrix by compiling all pairwise associations between the nodes. Our findings from graph theory application will help us to design and understand the complexity of visual pathway and its correlation to perception.

Anuradha **CHOUDRY**
B.K. **VINAYACHANDRA**
Centre for Indian Psychology
JAIN UNIVERSITY
Bangalore, India

An Experiential Understanding of the Self and its Psycho-social implications as reflected in the lives of Sri Ramana Maharshi and Sri Aurobindo

The dictum 'Know Thyself' from the Temple of Apollo in Delphi, is regarded as a very enigmatic phrase by Western Philosophers who have, over the millennia, tried to decipher what the term 'Self' could imply and then whether this Self was a knowable entity or not and so on and so forth. The Indian counterpart of the phrase, *'ātmānam…viddhi'*, however, as declared in the Kathopanishad, is regarded as the quintessence and goal of all aspirants who seek to know the deepest truth of their identity as the Self or the *'ātmā'*, which has been acknowledged and prescribed as an experiential reality by great experimenters on the path of Self-knowledge. In recent history, Sri Ramana Maharshi and Sri Aurobindo, amongst others have reaffirmed the fundamental truth of this dictate through rigorous practices of Self-understanding and have given detailed descriptions of their experiences. This paper attempts to analyse and explore the various facets of their experience along with their manifestations which corroborate with the concept of 'peak experience' and 'plateau experience' states described by Maslow.

Pragyanparamita **MOHAPATRA**
Email: upragyanparamita@gmail.com

JAWAHARLAL NEHRU UNIVERSITY
New Delhi, India

Irreducibility of Consciousness: Arguments from the Inverted Spectrum

Consciousness is both familiar and is an ever mystifying to us. We know consciousness more intimately than we know the rest of the world, but we understand the rest of the world better than we understand consciousness. Consciousness is a very fascinating but mysterious phenomenon, it is difficult to state what it is, what it does, or why is it there? Experience is integral part of consciousness. Now, the question arises, what do we mean by conscious experience? It may be explained as "the subjective quality of experience." Now the questions may arise like, why should there be conscious experience at all? What is the nature of conscious experience? In an attempt to answer this question, physicalism claimed that the phenomena of conscious experience can be explained by physical and mechanical terms. It can be reducible to physical process or facts of brain. Now, if this is so, then, the question sticks to our mind is: is consciousness itself merely physical? Or is it only associated to a physical system? If it is only associated to physical system, then one can say that, though physical states and processes are necessary for consciousness but they do not constitute the whole phenomena of consciousness. It is widely believed that the most fundamental facts about our earth are physical facts; and all other facts are dependent on the physical facts. So, consciousness might be explained in physical terms. There are many arguments that are given by philosophers against reducibility thesis of physicalism and functionalism. The argument from inverted spectrum is one of the major arguments in contemporary philosophy which explains that this reductionist approach is problematic. The Inverted Spectrum argument claims that consciousness is not logically supervenient on the physical.

Let me very briefly explain, what is the argument from inverted spectrum? Imagine, that a human being physically identical to me but with inverted conscious experiences. One might imagine, for example, that where I have a red experience, my inverted twin has a blue experience, and vice-versa. In this context, though the neurobiological states of twins are same or functionally identical, their experiential states differ. The whole system of neurobiological states of twins cannot show why a particular kind of experience, for example-red, is associated with a particular neurobiological state. The consciousness experience states of twin are functionally identical but experientially differ. So, the conclusion of this analysis is that consciousness experience states do not supervene on physical states. Recently, some physicalists are arguing that the inverted spectrum thesis is a logical impossibility and more over, it does not threat to the basic thesis of physicalism. My aim here is to critically examine the conclusion of inverted spectrum argument and I will contrast the views of David Chalmers, Ned Block on the one hand, and Michael Tye, Churchland on the other. My main intention is

to argue that it is still difficult for physicalism to penetrate into the deeper aspect of consciousness and to solve the hard problem of consciousness.

Manoj Kumar **PANDA**
Centre for Philosophy
Email: mpanda84@gmail.com

JAWAHARLAL NEHRU UNIVERSITY
New Delhi, India

The Content of Conscious Experience: Phenomenal and Intentional

Consciousness is one of the most integral part of living organisms and in particular, human beings. It is through conscious experience, our mind relate to the external world. The philosophical notion of consciousness is controversial. Various philosophers throughout the ages have tried to understand it in different ways. In early phenomenological tradition (Brentano, Husserl etc.) the concept of consciousness and intentionality are inseparably blended together. But in recent times, philosophical discussions on 'consciousness' have taken broadly two trajectories. Some philosophers take consciousness as consciousness of something or some states of affairs. Some others take it as in itself. Since the time of Brentano, it is widely held that consciousness is always consciousness of something, to be aware of or being aware that something or some states of affairs is the case. The 'directedness' or 'aboutness' feature of consciousness or mental states is called intentionality and mental states that are said to be directed at or about something are called intentional states. On the other hand, a different account of consciousness holds that consciousness is not always consciousness of something. It is rather understood as an intrinsic property of experience, a property that is due to the subjective features of consciousness as such. According to this interpretation, phenomenal or subjective quality of a conscious state is the most important feature and a state which has the same is called a phenomenal state. The subjective inner perspective attached with every phenomenal state is called 'qualia'. There is something it is like to possess a phenomenal conscious state, for example, to taste pickle, to smell rose, to feel nervousness etc. What it is like to undergo these experiences is known as the phenomenal character of experience.

So, there are two different properties of consciousness i.e., intentionality and phenomenology. Intentionality is the property of being directed towards world, while phenomenology refers to intrinsic subjective quality of conscious experience. The debate between 'Intentionalism' and 'phenomenalism' has been a great chasm in the philosophy of mind. The main focus of the debate is whether one of the two properties is exhausted by the other one. The intentionalists would respond to this question by saying that the phenomenal properties of experience is exhausted by its representational content and thus phenomenal content of conscious states

is nothing but identical with and supervene on representational character. According to this view, if representational content of any two possible conscious states differ, then their phenomenal content also differ and if their representational content remain the same, their phenomenal content would also remain the same. On the other hand, phenomenalism suggests that the phenomenal contents of conscious states go beyond the representational content of experience. Phenomenalists are of the opinion that it is the intentional content of experience which is exhausted by the phenomenal character. The phenomenal content of any possible experiences may vary, while their representational content remain constant and their phenomenal content may held constant while their representational content vary.

My main intention in this paper is to discuss some of the problems involved both in reductive intentionalism or physicalism on the one hand and pure phenomenalism, on the other. This paper is in search of a theory of intentionalism or an objective phenomenology which takes care of our phenomenological domain in its minute detail. The distinction between phenomenal and intentional is a superficial distinction and for a better understanding of consciousness, it is not always healthy to make the distinction. During the course of our discussion, we will try to show that intentionality and phenomenology go hand in hand in most of our important conscious experience. The result will be that we cannot succeed while giving a phenomenal account of our experience excluding the intentionality altogether and vice-versa. The challenge before us is that, on the one hand, we have to reject some form of subjectivity and objectivity and on the other hand, we have to retain some form of subjectivity and objectivity. The illusion that subjective-objective, phenomenal-intentional cannot cohere needs to be dismantled.

Christoph **D. DAHL**
Malte **J. RASCH**
Masaki **TOMONAGA**
Ikuma **ADACHI**
Primate Research Institute
Email: dahl@pri.kyoto-u.ac.jp

KYOTO UNIVERSITY
Kyoto, Japan

Nature or Nurture in Face Perception?

A crucial ability in primates is face recognition. Yet, the contributions of experience-expectant innate components and ongoing lifetime experiences to face processing are matter of debate[1]. Perceptual narrowing, a developmental process early in life, is assumed to be triggered by innate components and tunes the recognition system towards the predominant race[2] and species[3]. At the same time, face representations qualitatively change with lifetime experience[4,5].

The interaction of these two processes has not yet been described - to date a conceptual framework to tease them apart does literally not exist. Here, we show that both of these components contribute to face perception by investigating a very rare case of a species with lifelong experience with non-conspecific faces, i.e. the chimpanzees (*Pan Troglodytes*) living in captivity and nurtured by humans. We contrast performance scores of young (YC) and old chimpanzees (OC) in a delayed matching-to-sample task (DMS), showing an advantage of discrimination in chimpanzee faces early in life (YC), followed by an increase in discrimination performance for human faces accompanied by a deterioration in performance for conspecific faces later in life (OC). Further using a chimeric face task, the extent of cerebral laterality towards the right hemisphere correlated with the discrimination performances. We confirm these findings with computational modeling and provide functions describing the relative contribution of early and late processes in face perception. Thus, perceptual narrowing indeed tunes the face perception system towards a conspecific morphology; however, experience shapes the face template along the critical dimension of the faces exposed to in the long term.

References

[1] McKone, E. & Crookes, K. Understanding the developmental origins of primate face recognition: Theoretical commentary on Martin-Malivel and Okada (2007). *Behavioral Neuroscience* **121**, 1437-1441, doi:Doi 10.1037/0735-7044.121.6.1437 (2007).

[2] Kelly, D. J. *et al*. The other-race effect develops during infancy: evidence of perceptual narrowing. *Psychol Sci* **18**, 1084-1089, doi:10.1111/j.1467-9280.2007.02029.x (2007).

[3] Pascalis, O., de Haan, M. & Nelson, C. A. Is face processing species-specific during the first year of life? *Science* **296**, 1321-1323, doi:10.1126/science.1070223 (2002).

[4] Diamond, R. & Carey, S. Why faces are and are not special: an effect of expertise. *J Exp Psychol Gen* **115**, 107-117 (1986).

[5] Johnson, K. E. & Mervis, C. B. Effects of varying levels of expertise on the basic level of categorization. *J Exp Psychol Gen* **126**, 248-277 (1997).

V. V. **BINOY**
Rajesh **KASTURIRANGAN**
Anindya **SINHA**
Email: vvbinoy@gmail.com

NATIONAL INSTITUTE OF ADVANCED STUDIES
Bangalore, India

From Sentience to Consciousness: What can Fish Tell Us?

Evolutionarily primitive vertebrates, fish potentially serve as critical model systems to study the emergence of 'creature consciousness' in animal phylogeny. The problem of whether fish

are indeed conscious and can experience pain is increasingly attracting attention as fish cultivation becomes more prevalent and as fish species are targeted as ideal genetic, neurological and behavioural model systems in scientific research. A great challenge to studying consciousness in fish is the significant lack of a universally applicable definition of consciousness. Consciousness is generally an umbrella term including within it sleep/wakefulness, perceptual awareness or the possession of any mental state and culminating in 'extended consciousness' involving a complex sense of self, ability to think one's own thoughts, awareness of others and other's minds and an awareness of one's past and future. Within this wide range of phenomena, 'core consciousness', a type of basic sense of self in the immediate moment, existing independently of reasoning or language, could be present in non-linguistic species such as fish.

As 'accurate report' methodologies cannot be applied to fish, alternative strategies such as a search for evolutionary homologies in complex cognitive behaviours, anatomical substrates and reported physiological correlates of conscious states need to be adopted. Although several aspects of their brain development, anatomy and physiology are different from those in mammals, fish possess many cognitive abilities once considered to be uniquely human as, for example, sleep, sleep rebound or perceptual awareness. Typically mammalian behaviours related to anxiety, fear, addiction, social stress, coping, play, long-term memory, and problem-solving and decision-making abilities have also now been recorded in different fish. They are capable of individual recognition, possess Machiavellian intelligence, and apply knowledge of the prevailing dominance hierarchy, acquired through transitive inference, during social decision-making, and all of this in the absence of a well-evolved neocortex. Evidence is, however, growing for considering the telencephalon of the fish brain as homologous to the mammalian neocortex. Several neural correlates of pain, a conscious state, including C fibres and A-delta fibres, a substance P-like peptide involved in the transmission and modulation of pain in tetrapods, and pain-mediating opioids are also present in fish.

Certain other features of consciousness including sentience or conscious cognition (the ability to be aware of internal and external stimuli) and primary consciousness ("the ability to generate a mental scene in which diverse information is integrated for the purpose of directing behaviour") can also perhaps be attributed to fish. But do these species possess access, phenomenal and *self-consciousness? This lacuna in our knowledge could partly be due to the typically human* speciesist tendency to attribute human-like conscious abilities only to animals similar to themselves and the failure to ask what it is like to be a fish, a group of approximately *32,000 species that experience ecological challenges very alien to our species. T*his study analyses the possibility of using fish as a model system to test the origin of multiple forms of conscious cognition, which could potentially provide evidence of convergent evolution at the behavioural and cognitive level, notwithstanding morphological and anatomical differences at the neurological level, across all vertebrates.

Shreejata **GUPTA**
Anindya **SINHA**
Email: shreejata@gmail.com

NATIONAL INSTITUTE OF ADVANCED STUDIES
Bangalore, India

Looking under the Light: Executive Functions as a Path to Understanding Nonhuman Consciousness

Consciousness in humans is best understood by the expression of their goals and intentions, as expressed through language. It is perhaps due to the lack of a common language between humans and nonhuman animals (henceforth animals) and/or for a historical tradition of attributing a 'mind' exclusively to humans, that animal consciousness continues to remain a controversial issue. Although animals are considered conscious in the ordinary sense of wakefulness as well as their ability to respond appropriately to stimuli, the next step towards a more reasoned understanding of the phenomenon appears difficult, if not impossible. Evidence of more complex states of phenomenal, access or self-consciousness in animals, for example, is yet to be revealed. Most investigations of animal consciousness have attempted to identify behaviours, which are possible expressions of mental phenomena. These endeavours, however, usually reach a blind end when they eventually fall prey to Morgan's canon and multiple, more parsimonious, explanations of such behaviours are provided, occasionally restricted to simpler stimulus-response circuits and associative learning paradigms. Interestingly, human consciousness has also been investigated following a similar approach. Human behavioural expressions such as planning, monitoring, regulating emotions, inhibition of actions, attentional flexibility, working memory, error detection, decision-making, and resolution of conflict are some of the behavioural proxies that help us to understand various facets of consciousness in this species.

All these processes taken together, however, also encompass a complex cognitive construct commonly referred to as executive functions; these enable individuals to execute voluntary actions, make choices among alternatives and respond appropriately to novel situations in order to achieve their short-term and long-term goals. Executive functions are usually controlled by the pre-frontal cortex of the human brain and develop with age, usually through social stimuli. There exists evidence of a strong correlation between the emergence of consciousness and the development of executive functions in humans. In the light of such findings, a change in attitude towards animal consciousness studies is strongly warranted. We must try to understand the structure and organisation of the basic executive functions in animals, for these constitute the building blocks of consciousness; it is perhaps time that we give up our vain search for 'consciousness' as a complete phenomenon. Consciousness is a process that has primarily been defined in human psychology and it is possibly not applicable to nonhuman species, although the problem may largely be methodological. A bottom-up approach, however,

could provide an evolutionary approach to understanding executive functions and such processes in animals are likely to be distinct from those in humans only in degrees but not in kind. Research from such a perspective will hopefully enable us to learn much more about animal minds as well as the evolution of human consciousness and ultimately alter our present understanding of animals as beings slightly more developed than Cartesian automata.

Namitha A **KUMAR**
Email: namitha29@gmail.com

NATIONAL INSTITUTE OF ADVANCED STUDIES
Bangalore, India

Body Consciousness and Proprioception

The poster seeks to clarify the critical difference between body consciousness and proprioception and highlight the crucial role of a second-order consciousness of the body which steps in whenever there is a disturbance in proprioceptive functions. Taking off from Merleau-Ponty's ideas of embodied consciousness and the concept of "embedded-embodied coping," (Cf. Protevi, 2008), the poster proposes that the human body adapts to disturbances in proprioception with the help of the corporeal body and psychic consciousness. Proprioception was discovered by Sherrington in the 1890s and he named it 'proprioception' meaning 'hidden sense' distinguishing it from 'exteroception' and 'interoception.' Proprioception is "that continuous but unconscious sensory flow from the movable parts of our body (muscles, tendons, joints), by which their position and tone and motion are continually monitored and adjusted, but in a way which is hidden from us because it is automatic and unconscious" (Sacks, 1986). It is the function which enables us to feel our bodies and keep track of movement and position.

Taking the case study of twenty-seven-year-old Christina (Sacks, 1985), the poster presents how she overcomes the feeling of a 'disembodied self' and gets back to a somewhat 'normal' routine with the help of her visual perception, body and an acute second-order body consciousness. With her proprioceptive abilities and body schema disturbed, Christina has to have an acutely aware body consciousness in order to move and locate her body. Even the simplest task of sitting up requires a high degree of body awareness. While a normal human body with proprioceptive abilities intact does not require the intervention of consciousness to move and feel the body, a disturbed proprioceptive ability relies solely on this acute second-order body consciousness. In Christina's case, every move becomes calculated and in a sense 'artificial.' The poster endeavors to show the role of human adaptation in overcoming acute neural disturbances.

References

[1] Sacks, Oliver (1986). *The Man who Mistook his Wife for a Hat*. New York: Summit Books.

[2] Mullarkey, John & Lord, Beth (Ed.). Protevi, John: Philosophies of Consciousness and the Body. (2009). In *The Continuum Companion To Continental Philosophy*. London: Continuum.

K. **LAKSHMI**
Email: 10.lakshmi@gmail.com

NATIONAL INSTITUTE OF ADVANCED STUDIES
Bangalore, India

Conflict and Transformation: Self and Well-being in the Mahabharata

Enhancing the self is an innate characteristic of humans. The self is the fundamental basis of all human experience which influences human identity. It gives the individual personality its unique and dynamic character and is the subjective nucleus of the personality which represents the inner world of the individual. Knowing the self and feeling one's worth are foundational to acquiring a meaningful life leading to one's well-being. Well-being is integrated in the self through its transformation, actualization, and enhancement. In this progress toward meaning, purpose and action it appears that crisis and conflict is crucial, necessary, and unavoidable for successful adaptation and transformation and enhancement of the self. Psychological transitions and crises are the times when we reassess our picture of the world and our means of being a part of it. These periods of transition are vulnerable periods and overcoming, resolving or transcending crises and conflicts brings strength and maturity, and a psychic harmony in the personality. The self establishes an intimate, and possibly ethical, relation between past and future as one embarks on the present work of crisis and conflict resolution. One gains wisdom and knowledge through the self. In the Indian conception self moves beyond the bounded notion of specific domains and is regarded holistically. It is the 'lived' experience as well as the transcendental goal.

In the Mahabharata, descriptive portrayal of the prototypical, and complex and diverse psychological aspects of the human psyche are presented; so are emotions, conflicts, crises as well as varied ways of coping. The ideas and consequences of the "lived experience" of the characters in this epic *engage* the consciousness of the people. The intent of the text is also therapeutic in seeking to prompt the mind to a greater awareness of one's identity and a fostering of spiritual insight, emotional calm and acceptance of the inevitable leading to liberation. This is not necessarily trans-death but a more symbolic liberation of moving beyond crises and conflicts, and of liberation from one's illusions, apathy of thought and *aviveka*. The epic emphatically ascertains the human potentials and possibilities, and

enhancement of self. In this paper, the psychological conflicts of the characters of the Mahabharata will be examined. Conflicts, dilemmas, and crises of the characters will be studied using a phenomenological approach for a greater understanding of the trajectory of one's self-concept. The self is not merely built in the physical space but is understood in the phenomenological world of experience. Coherence, consistency, integrity, and maturity are the signs which are a gestalt for recreation and growth of self through desires, meanings, purposes and values.

Bhavani Shankara **BAGEPALLY**
Rakesh **BALACHANDAR**
Email: bshankara@gmail.com

NATIONAL INSTITUTE OF MENTAL HEALTH AND NEUROSCIENCES
Bangalore, India

Consciousness, Gender and Ageing: An Exploratory Resting State fMRI study

Background: The "conscious access hypothesis" or global workspace (GW) theory, suggests, consciousness is globally distributed with multiple brain network organisations. Gender and Aging have independent effects on both brain structure & function, thus influencing cognitive functions. Advanced resting state functional Magnetic Resonance Imaging (fMRI) methods assist in better understanding of the intrinsic properties of functional brain network organisation. Even at resting state, presence of large-scale neuronal processes are observed. These spontaneous random fluctuations in Blood Oxygen level Dependent brain fMRI activity showing strong temporal coherence (co activation) are called "resting state networks" (RSNs). However, it is suggested that integrity of this RSN pattern in the Default Mode Network (DMN) would differ in different states of consciousness. Study of these RSN's will deepen our understanding of graded consciousness and hence clarify the concept of "consciousness" in neurocognitive and neurophilosophy research. *Aims & objectives:* To generate and identify different RSN from the resting state fMRI. To determine whether gender differences existed in RSN during a task-free resting state. To examine the role of age related changes in RSN.

Methodology: We collected the resting fMRI data of healthy subjects of Dallas and ICBM (International Consortium for Brain Mapping) groups from the "1000 functional connectome project" database (http://www.nitrc.org/projects/fcon_1000). The Dallas data had 12 males and (aged 41.3±19.5years) and 12 females (aged 43.9 ± 21.4years). The ICBM data had 41 males (aged 44.7±15.4years) & 45 females (aged 43.8±20.13years). Both the groups were comparable in age and gender. The fMRI data analysis was carried out using Probabilistic Independent Component Analysis (ICA) as implemented in Multivariate Exploratory Linear Decomposition into Independent Components (MELODIC) Version 3.10, part of FSL (FMRIB's

Software Library, www.fmrib.ox.ac.uk/fsl). The independent components were observed & some of the RSN were identified. Dual regression analysis was performed to compare the RSN's.

Results: ICA analysis generated 24 & 16 RSN's respectively from the Dallas and ICBM data, out of them the Default Mode Network, Primary motor, Primary visual, Extra striate visual, right & left parieto-frontal frontal network, cerebellar networks were identified. Among the Dallas group, males showed significantly ($p<0.05$ corrected) higher left fronto-parietal network activity compared to females. Ageing was showing trends towards negative correlation with DMN ($P<0.05$ uncorrected). Among the ICBM data trends towards alterations were observed in the DMN between the males and females ($P<0.05$ uncorrected). There is no age related changes observed in the DMN among ICBM subjects. *Discussions:* The study results shows presence of various RSN's among the healthy subjects. Study observes alteration in some of the RSN's with respect to gender and thus probably altered consciousness. The changes in the RSN's with age, suggests RSN networks were sensitive to aging effects, which could underlie the deterioration of various cognitive processes that occurs with aging.

Shantala **HEGDE**
Cognitive Psychology Unit
Center for Cognition & Human Excellence
Email: shantalah@nimhans.kar.nic.in

NATIONAL INSTITUTE OF MENTAL HEALTH AND NEUROSCIENCES
Bangalore, India

Response to Music Transcending Emotions

Emotional power of music is acknowledged all cultures. Speculation on how and why music induces emotions has been topic of debate over centuries. Systematic investigation of the same has been attempted from a multidisciplinary perspective in the recent past. Neuromusicological studies hitherto have demonstrated that musical emotions involve neural substrates, evoke neurophysiological and autonomic responses similar to emotions experienced in real-life events. Different cultures have placed different values on the physical and emotional content of music. In certain ritualistic contexts music has the power to shift level of consciousness to what is known as trance. Indian classical music (ICM) for instance is intimately linked with devotional, spiritual and religious content. The 'ragas' unique to ICM (which has no similar counterpart in Western classical music) provide the base for musical elaboration and improvisation. There are hundreds of ragas and each of them is associated with affective-themes termed as 'rasas'. Traditionally in the North Indian classical music, also known as the Hindustani classical music (HCM) tradition, each raga elicits a different emotional state are considered inherently peaceful. A study was carried out using six ragas of HCM, three to

evoke happy emotion and three to evoke sad emotion. Two excerpts from each raga formed the stimulus of duration (mean-duration = 129.00, SD =6.00 seconds). Ratings by thirty-one musically untrained adults on a 5-point Likert scale showed that stimulus was distinguished as conveying happy and sad emotions above level of chance. Subjective reports of the emotional experience area consistent with description of raga-rasa theory (Hegde S, 2010). This study was followed by an electrophysiological study on twenty right-handed musically untrained adults. EEG was recorded using the Neuroscan (Syn Amps), sampling rate of 256 Hz, with 30 electrodes placed according the 10/20 electrode placement system. Artifact free data was analyzed using fast Fourier transformation (FFT) with a Hanning window with 50% overlap and interval of 1023ms with a resolution 0.978 HZ and range of 500Hz. Alpha asymmetry was calculated using the formula (ln Right power- ln Left power). Results following spectral analysis showed increase in alpha power in right hemisphere during music listening condition and increase in overall theta and delta power during music listening condition compared to eyes closed rest condition (Hegde S & Rao S L, 2011). According to subjective report, the chosen excerpts of ragas evoked peacefulness (Shanta) and devotion (Bhakti), feeling of submission to a higher level of consciousness (Prapatti). EEG correlates showed an increase in alpha, delta and theta power has been previously linked with highly relaxed state such as meditative states. As per the HCM tradition melodic elaboration of ragas by an artist is an ongoing creative field, an altered state of consciousness which an artist has to attain also to create a similar state of mind in the listeners. The present paper will elaborate further on the fact that ragas of HCM have the power to evoke a state of consciousness beyond emotions.

K. **RAJAKUMARI**
Shobini L. **RAO**
A **THAMODHARAN**
Sakshi **KORDE**
SHARATHCHANDRA
V.R. **SARANYA**
Rose Dawn **BHARATH**
Deepak **ULLAL**

NATIONAL INSTITUTE OF
MENTAL HEALTH AND NEUROSCIENCES
Bangalore, India

Cognitive Neuroscience Centre, Dept of Clinical Psychology
Dept of Neuroradiology
Email: rajkumari.pampa@gmail.com

Neural Correlates of Unpleasant Emotion: An fMRI Study

Background: Emotion entails cognitive processes that may either be conscious or unconscious. Emotions are internal states of higher organisms that serve to regulate in a flexible manner an

organism's interaction with its environment. Emotions influence all aspects of cognition. Studies in the field of neuro imaging indicate that emotions involve activations of both cerebrum and cerebellar brain areas. Education influences the processing of both emotions and cognitive functions. *Aim:* To study the neural correlates of unpleasant emotions in healthy normal volunteers; To study the effects of education on unpleasant emotions *Sample:* Informed consent was obtained from healthy volunteers. The study recruited 61 right handed educated young adults in the age range of 18 – 40 years (7 females & 23 males, in school educated, 10 females & 21 males in college educated). The mean age of the school educated group was 28.46±6.03 years and college educated group was 25.09±3.51 years. The mean number of years of education was 8.36±2.07 for school educated and 15.48±2.48 for college educated

Task: The unpleasant pictures (mean valence was 2.72±0.52 and mean arousal was 4.74±0.58) and neutral pictures (mean valence was 4.54±0.33 and mean arousal was 4.12±0.44) were chosen from International Affective Picture System (2006). Unpleasant and neutral pictures were presented in separate block design paradigms. In each block there were 10 active and 10 rest scans (cross hair stimulus) alternating 4 times totaling to 80 dynamics. Subjects merely viewed the stimuli in both conditions.

Method: fMRI scanning: MRI scanning was conducted in a 3 Tesla Siemens Magnetom Skyra scanner. Anatomical scan was acquired with a T1 MPRAGE sequence. The FOV was 240mm, slice thickness was 0.9mm and the number of slices per slab was 176, voxel size was 0.9*0.9*0.9mm. fMRI was acquired with an EPI sequence. The FOV was 192mm, slice thickness was 4mm, number of slices obtained was 36, voxel size was 3*3*4mm and the matrix was 64*64, TR was 4 seconds, TE .03 seconds. Rest active paradigm design was adopted for unpleasant and neutral conditions. fMRI Analysis was done using Statistical Parametric Mapping 8. Preprocessing consisted of Realignment, Normalization and Smoothing. General Linear Model with FWE, $p<0.05$ significance were applied (1st level analysis). One sample t test was used in the 2nd level analysis. Activations in the block with neutral pictures were subtracted from that of unpleasant pictures for school and college educated.

Results: In school educated left cerebellum was activated, where as bilateral cerebellum was activated in college educated; Bilateral temporal lobe was activated in both school and college educated; Bilateral frontal and occipital lobe activation was found in school educated; only left frontal and occipital was activated in college educated; Bilateral parietal was unique to college educated; Left thalamus was unique to school educated. *Conclusion:* Cerebrum and Cerebellar activations were indicated in unpleasant emotions. The study demonstrates that there are both common and unique components of the neural networks mediating unpleasant emotions in school and college educated.

R. **SHARATHCHANDRA**
Shobini **L RAO**
A. **THAMODHARAN**
V.R. **SARANYA**
Rose **DAWN**

NATIONAL INSTITUTE OF
MENTAL HEALTH AND NEUROSCIENCES
Bangalore, India

Dept Of Clinical Psychology
Cognitive Neuroscience Centre
Dept of Neuroimaging and Interventional Radiology
Email: looplogic@gmail.com

Cross Modal Integration of Facial and Vocal Expressions of Fear

Background: The ability of the human brain to integrate multisensory inputs to form an emotional percept is an essentiality for everday social cognition and interaction. Emotion is generally perceived by integrating visual and auditory modalities.

Aim: To examine brain regions mediating cross modal integration of affective perception.

Method: Sample: Ten adult right handed normal volunteers, 6 of them female, all with a mean age of 23 years and mean education of 20 years of schooling gave informed consent and participated. Task: Coherent audio-visual inputs of fear formed the stimuli. The visual component of stimuli consisted of photographs of 40 faces (25 Male and 15 female) expressing the initial expression of intense fear, based on features defined in the fear expression subset of 'EKMAN FACES'. These were acquired from theater actors of Indian origin. The audio component of the stimuli consisted of male and female vocalizations of fear which were variation of the 'Wilhelm Scream' acquired under a Creative Commons Sharealike Licence (from Freesound.org) and preprocessed to a standard level of amplification (-3db) to play at an onset time of 200 msec after the photograph appeared.

FMRI acquisition: Scans were acquired in a 3 Tesla Siemens Magnetom Skyra scanner. Anatomical images were acquired with T1 MPRAGE sequence and FMRI with EPI sequence. TR was 3 secs, TE .03 secs, 80 dynamics with FOV of 192mm, slice thickness 4mm, number of slices 36, voxel size 3*3*4mm and the matrix 64*64. A block design paradigm consisting of 10 active and 10 rest stimuli (cross hair) alternating 4 times totalling to 80 dynamics was used. Subjects merely perceived the stimuli. fMRI Analysis: The fMRI data pre-processing (realignment, normalization and Gaussian smoothing) was done with SPM Version 8 and analyzed at $p < 0.001$ level of significance with no FWE correction. One sample t test was used in the 2nd level analysis.

Results: Crossmodal fear perception activated Bilateral Occipital, Bilateral Parahippocampal Right Amygdala, right Uncus, right claustrum, Right Superior Temporal, left Insula, left superior

parietal, left premotor, bilateral superior frontal and inferior frontal, right medial frontal, right anterior Cingulate, right caudate, right putamen, bilteral thalamus and left cerebellum.

Conclusions: The predominant activation of Right Superior Temporal region is attributed to the processing of emotional vocalisation; Bilateral occipital activation to visual stimuli; Bilateral Parahippocampal Gyri activation to the arousal of emotional memories; activation in right Anterior Cingulate and right medial frontal gyrus to control of emotional arousal. The activation in the Right Amygdala, right uncus and left insula could be attributed to the coding of the fear. The activations in bilateral superior and inferior and middle prefrontal areas spanning Broadman areas of 8, 9, 10, 44, 46 and 47 indicate the role of executive functions in crossmodal integration between visual and auditory affective perception.

Susan **THOMAS**
Shobini L **RAO**
Cognitive Neurosciences Centre
Email: susansusmi@gmail.com

NATIONAL INSTITUTE OF MENTAL HEALTH AND NEUROSCIENCES
Bangalore, India

Neuroscience of Meditation and its implications to Consciousness

The interest in the brain correlates of meditation gained momentum in recent years. The term meditation describes practices that self-regulate the body and mind. Different meditation techniques share some distinctive features, but vary in their purpose and practice. Meditation is operationally defined as practises that (1) utilize a specific and clearly defined technique (2) involve muscle relaxation somewhere during the process (3) involve logic relaxation (4) are self induced and (5) use a self-focus skill or “anchor” for attention. The two broad forms meditation are open minded meditation and focussed attention meditation. Some forms of meditation combine both these methods. The types of meditation that have been researched include Buddhist and Zen based meditation, insight meditation, mindfulness based meditation, transcendental meditation, Sahaja Yoga meditation, Kundalini Yoga meditation and Sudarshana Kriya. The effects of meditation on the brain have been examined from two perspectives. The first is a clinical perspective and has looked into the effects of meditation on the brain by documenting clinical improvement in symptoms of depression, anxiety, panic and rumination following mindfulness based meditation, Sudarshana Kriya, Kundalini Yoga and Sahaja Yoga meditation. Improvement in brain functioning seen though improvements in cognitive functions of attention, concentration, verbal creativity, visual reaction time and inhibitory control has been observed after mindfulness based meditation.

Studies from the second perspective are direct observations of electrical (Electroencephalography (EEG) / Evoked Response Potential (ERP)) and blood flow (Positron Emission Tomography (PET) and Functional Magnetic Resonance Imaging (fMRI)) changes. Research has found that meditation alters the brain wave patterns in EEG in terms of power increases in theta and alpha bands, increased power coherence and gamma band effects and increase in percentage of gamma waves in Buddhist meditation. Meditation improves the amplitude of P300 in an auditory oddball task and attentional allocation. Studies have shown increased regional cerebral blood flow during compassion meditation. We have found activation in bilateral superior temporal gyri, right temporal lobe, right insula, left inferior parietal lobule, lateral globus pallidus and culmen of the cerebellum in meditation naive subjects who were listening to Gayatri mantra. Cortical thickening has been observed in anterior cingulate cortex and dorsolateral prefrontal areas and in right insula and prefrontal area in experienced insight and Vipassana meditators. Meditation, in the spiritual literature is associated with transcendence and higher levels of consciousness. Meditation is a process of personal transformation validated through subjective experience of peace, bliss, feeling of oneness and transcending negative emotions such as greed, anger, lust, jealousy and fear. Neuroscience research has not associated brain changes with these changes in conscious experience. We support the viewpoint that brain changes associated with meditation should inform us about parameters of consciousness. While studying expert meditators, the brain changes during meditation should be associated with personal experience of transformation for the research to be meaningful to both spirituality and science. Neuroscience research is on its way from a reductionist approach to a constructivist approach, and this paradigm shift will help to understand meditation and consciousness from a scientific perspective.

Mamta **SHARMA**
Department of Psychology
Email: mamtaagnihotri@sify.com

PUNJABI UNIVERSITY
Patiala, Punjab, India

Music: A Pathway to Higher Consciousness

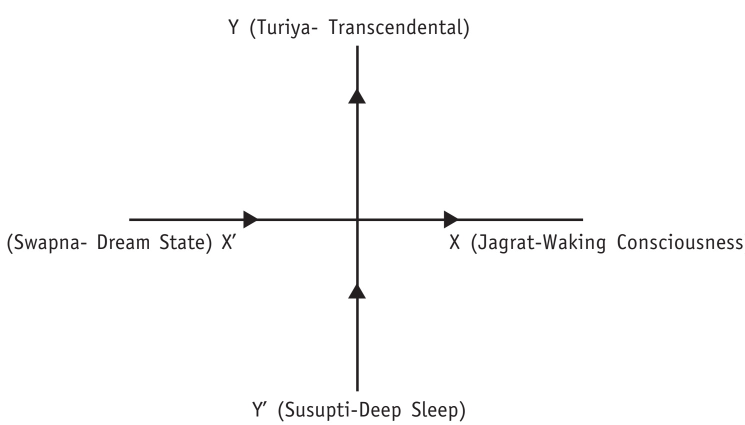
Consciousness refers to an individual's awareness of one's unique thoughts, memories, feelings, sensations and environment. One's conscious experiences are constantly shifting and changing dramatically from one moment to the next. Deliberate processual changes in the perception of one's own person, own self and body through music, meditation, hypnosis and psychoactive substances etc. have been used for therapeutic purposes in many ways. This paper aims at music therapy as a portal to alter consciousness. There is no greater way to attain spiritual enlightenment and awareness than through music, if only the music is rightly understood.

"Music opens to man an unknown region, a world that has nothing in common with the world that surrounds him, in which he leaves behind all ordinary feelings to surrender himself to an inexpressible longing." Music elevates and animates the level of consciousness. According to Vedanta, the four states of consciousness can be superimposed on the co-ordinate axis (Yati, N.C., 1987). 'Jagrat' the waking consciousness corresponds to the Horizontal Positive; 'Swapna' the dream state is placed on the Horizontal Negative; 'Susupti' the deep sleep state corresponds to the Vertical Negative; 'Turiya' the transcendental represented by the Vertical Positive.

The Horizontal Axis represents Perceptual Values from subjectivity to objectivity from the negative towards the positive direction, and the Vertical Axis represents the Conceptual Values from the negative towards the positive side. Yati further elaborates that stream of consciousness have five modes:

1. KSHIPTAM – The continuing state of flux or flow, opposite to consciousness.
2. VIKSHIPTAM – Is the interest making a quantum jump from one state of concentration to another state of concentration. This involves distraction.
3. MOODHAM – A state of inertia which inhibits cogitation. This is opposed to proper mental function.
4. NIRODHAM – Holds an abeyance entry of a new stimulus when another one is being attended to. This is contributory to attention.
5. EKAGRAM – One pointedness i.e. Consciousness: where only one function is loved which is totally beneficial.

Ekagram comes only in one type of music in which the melody is so tuned that it doesn't agitate the hearing faculty i.e. raga for Nada Yoga. Music belongs to the positive side of the vertical axis that leads to heightened awareness of the quality of heightened meditation. Music with its roots in rhythm is related to the id and the unconscious as well as to the emotional elements and sensual experiences within the ego (Friedlander, M.1954). It is a powerful tool for personal growth and conscious living. If inner growth is the goal, one must



consciously surround oneself with music that truly supports that goal. Conscious living means to intentionally surround ourselves with the qualities we seek to develop, rather than passively accepting those things that our present state of awareness attracts naturally. Conscious living can be attained through music as it acts on consciousness more directly than most other mediums of communication.

Judu **ILAVARASU**
V. Sarasvati **MOHAN**
Alex **HANKEY**
Email: juduilavarasu@yahoo.co.in

SWAMI VIVEKANANDA YOGA
ANUSANDHANA SAMSTHANA
Bangalore, India

Gunas, Vasanas, Samskaras as Attributional Elements/Sources: Its Relevance in Consciousness Research

The word Consciousness as understood by the east and the west is little different. The western approach equates Consciousness to awareness, whereas the east considers Consciousness as unchanging phenomenon upon which everything else is superimposed. According to the east, consciousness it that continuum which pervades every where, and every time. The logical fallacy in measurement of consciousness is: we can not measure something which does not change. This is an inherent limitation of any measurement process. So when we say measurement, what do we mean by that and what do we really measure and what do we actually infer?

What we can best measure is what can be attributed. Right perception is to see exactly what is present devoid of any superimpositions and it leads to right knowledge. Analytical methods available today are considered superior because they don't have their own attributional influence and we consider them objective tools which are reliable. Whereas on the other side, taking self-introspection, self-report etc., are not considered as that valid and reliable. The reason being they have (subjects) their own attributional influence, thus prone to distortion of perception and therefore right knowledge. This paper attempts to discuss *Gunas, Vasanas, Samskaras* as a source of attributional bias.

Attributional bias/error according to Indian/eastern philosophy is due to our primordial ignorance. However, for the purpose of measurement, we need something grosser and tangible to our measuring tool. To enhance efficiency, we can adopt two sided approach. One to enhance efficiency of our measuring tool, so that it can capture subtle dimensions, on the other side find grosser manifestation of that subtle aspects which are more tangible and

which could be brought under the purview of measurement process. Both of them have their limitations. Objective measuring tools cannot always be used for it may lose the essence of subtlety when measured in a grosser form. Hence we must strike a balance. This paper attempts at the second ways, i.e., grossification of subtle phenomena. According to Indian thoughts, ignorance is the root cause, the fundamental source for all attributional bias (Adhyasa). But can we measure them? Direct measurement seems to be quite improbable. Ignorance is maintained due to our samskaras (imprints) which are constantly reinforced by our vasanas(tendencies). Can we measure them? Tough appears measurable, but cannot be since the definition puts some restrictions. Samskaras include sum total of all our imprints including from our previous births, so this makes us almost impossible to measure. Similarly Vasanas which are predominantly a person's natural behaving tendency could not be fathomed fully. Still at the grosser level we find gunas, sattva, rajas, and tamas. This seems to be a solution. Guna may give us a concrete platform. Each guna is defined by its behavioural characteristics which are easily available for concrete observation, from first, second, and third person point of view. This paper discusses gunas as a doorway to personality and consciousness research.

K.S. **KANNAN**
Department of Sanskrit
Email: ks_kannan@yahoo.com

THE NATIONAL DEGREE COLLEGE
Bangalore, India

Dementia as per Yoga and Neuroscience

Dementia has been defined as 'an acquired global impairment of intellect, memory, and personality but without impairment of consciousness' (Lishman 1978). The Upanishadic and the Yogic literature also speak of a certain state of Dementia where consciousness is not impaired but there is a suspension of various faculties. To what extent are the two similar, and where they differ, and what possibly could the causes be - are the questions probed into in this paper dealing with consciousness.

Bhausaheb **BIRADAR**
Narayanan **SRINIVASAN**
Centre for Behavioural and Cognitive Sciences
Email: bhausaheb@cbcs.ac.in

UNIVERSITY OF ALLAHABAD
Allahabad, India

Effects of Intention on Perception

The sense of agency depends on voluntary actions that are perceived to be intended by an observer. Studies investigating sense of agency have shown that predictive as well as inferential components are sensitive to contingency between intentions and actions. However, the consequences of intention on perceptual processing have not been studied in detail so far. In addition, we wanted to investigate the effect of relationship between an intention and its consequence on perceptual processing. Participants pressed a key to indicate the color they intended to see; they could choose to see either blue or yellow. In one condition, the intended color appeared 50% of the time. In the other condition, the intended color appeared 75% of the time. The participants had to respond to the shape of the colored stimulus (square or circle). The participants also performed a control condition in which they simply had to respond to a square or circle without any intention. Reaction times for the shape discrimination were measured in both the intended color and unintended color appearance trials. The results showed that participants were slower to discriminate the shape in the trials in which they had to choose to see (intend) a particular color compared to the control condition. When they intended to see a particular color, they discriminated the shape faster when the intended color appeared compared to unintended color for both the probability conditions. In addition, the participants were faster in the 75-25 condition compared to the 50-50 condition indicating that the participants were sensitive to the probabilistic relationship between the intention and the consequence. The results indicate additional processing related to the confirmation of the appearance of the intended information when participants actually intended to see an object, even though the intended dimension was irrelevant to the perceptual task to be performed. The study indicates that intention does have an effect on impending cognitive processes and further studies are needed to fully understand the mechanisms involved in intentions and its consequences.

Devpriya **KUMAR**
Narayanan **SRINIVASAN**
Centre for Behavioural and Cognitive Sciences
Email: devpriyak@cbcs.ac.in
UNIVERSITY OF ALLAHABAD
Allahabad, India

Hierarchical Sense of Self: Event Control Approach to Self

The concept of 'Self' has traditionally modeled as a mediator between perception and action, suggesting that self causes action. Some have argued that the self is 'epiphenomenal'. One way to understand 'self' is through an event-control approach (Jordan, 2003). This approach refers to 'self' as regularities in the environment, instead of a causal mechanism, arguing for a hierarchy of event control, with each level constraining the lower levels. Sense of Self is conceptualized as a flowing between these levels and characterized by different levels at different moments, depending upon the highest loop in the control-hierarchy where control is exercised. Current study provides empirical support to predictions based on event-control approach using a novel paradigm. The participant is subjected to a multi agent scenario, with all agents having a common goal and one of the agents being partially controlled by the participant. The participant has to identify the agent he/she is controlling, complete the goal, and rate his experience of 'self'. The amount of control that subject can exercise is manipulated five levels (from no control to full control). Results suggest that when subjects are not able to complete the goal, sense of agency increases as a function of control, suggesting the sense of self is characterized by the amount of control at perceptual-motor level. When subjects are able to accomplish the goal (catch the sheep), even a small amount of control is enough to elicit a strong sense of self as agency. This sense of self does not vary further with increasing control, suggesting that sense of self is affected by higher goal level control. Results suggested presence of a hierarchical system of control events. To further explore this hierarchy of control, a second experiment was performed, where we explicitly manipulated the levels in hierarchy by introducing 'congruency' (mapping between movement of joystick and movement of agent that user controls) as a separate variable. Results suggest that participants sense of 'self' is attached to a greater extent with the winner, irrespective of congruency and amount of control. When people misidentify with the non-winning agent, they do so to a greater extent in the low congruency condition compared to the high congruency condition, lending further support to a hierarchically organized control system view of self.

Mukesh **MAKWANA** **UNIVERSITY OF ALLAHABAD**
Narayanan **SRINIVASAN** Allahabad, India
Centre for Behavioural and Cognitive Sciences
Email: mukesh@cbcs.ac.in

Effect of Emotions on Time Perception using an Oddball Paradigm

Awareness of Time is influenced by many factors especially the emotional content of the experienced events. For example, time passes quickly during happy or interesting events and slows down during fearful or boring events. Studies on time perception using prospective temporal estimation have shown that attentional processes affect time perception. Paying more attention to the non-temporal aspects of the stimuli reduces the available attentional resources for time estimation that may result in contraction of time. Similarly, less attention to the non-temporal aspects of stimuli might make more attentional resources available for time estimation resulting in expansion of time. Several studies have investigated the effect of emotions on time perception using both emotional pictures and faces. Recent studies on emotion-attention interactions have shown that happy faces are mediated by distributed attention (less attentional resources) while sad faces are mediated by focused attention (more attentional resources). Given these emotion-attention links we have been investigating the effect of emotional content on time perception. Previous studies using an oddball paradigm with repeated presentations of a frequent stimulus and the oddball stimulus have shown that the oddball stimulus is perceived to have a longer duration than the frequent stimuli.

In an odd ball paradigm using happy or sad face as an odd ball stimulus among neutral faces, we have shown subjective contraction of time when the identity of the oddball and frequent face was the same and expansion time when the identity of the oddball and frequent face was different. In addition, the estimated duration was different for happy and sad faces. Given that the effects can be explained as due to the repetition suppression or attention, we performed the current study with repetition of frequent faces after the target face (emotional face was the first face seen). We used both the same identity and different identity conditions. The emotional face appeared first for a variable duration (300ms – 700ms in steps of 50 ms) followed by four neutral faces of same or different identity which appeared for standard duration of 500ms each. Participants were asked to make a duration judgment (longer or shorter) of an emotional face compared to the standard neutral face. Results show a significant change in the duration distortion factor (DDF) value for happy and sad emotional faces in the same identity conditions. Moreover, there was significant expansion of time for happy emotion compared to sad when the change in emotion involved the same person. In the different identity condition, no significant difference was observed between emotions. Time perception was dependent on the type of emotion as well as whether there was a change or

not in the identity of the person. The results indicate that perceived time is dependent on the emotional content of the stimuli and is thus mediated by attentional processes.

Maruti V **MISHRA**
Narayanan **SRINIVASAN**
Centre for Behavioural and Cognitive Sciences
Email: maruti@cbcs.ac.in
maruti.mishra07@gmail.com

UNIVERSITY OF ALLAHABAD
Allahabad, India

Types of Attention Affect the Content of Consciousness: Exploring Positive Afterimages

Attention and consciousness are strongly coupled. Some have argued that attention and awareness may oppose each other. Given differences in the types of attention, we earlier studied the relationship between types of attention and awareness using negative afterimages. Previous study showed that manipulating the scope of attention (focused vs. distributed) and perceptual levels of processing in both spatial and object relevant domains resulted in differences in afterimage durations. The afterimage durations were largest with the narrow spatial focus of attention. With size of focus matched, duration was larger for processing at the global level. In the current study, we investigated the role of types of attention and its relation to awareness using color positive afterimages. Positive afterimages are formed when one views at a colored surface containing a white region and then view a blank white screen wherein the hue of the surround is transferred in to the previously white region. In the previous study, we measured only afterimage durations and we wanted to investigate the effect of attention on appearance by measuring the color and clarity of the afterimages in addition to the onset and duration of afterimages. In this study, participants performed a central task with small, large, global or local (hierarchical) stimuli presented at fixation with a white square frame that acted as an inducer against a blue background. The stimuli were letters S, H, 6 and 9 presented in a random order for 500 ms each and the trial lasted 20 seconds. The participants task was to count the number of times the letter 'S' appeared on the screen and then report the onset, offset, color and clarity of the positive afterimage. The adaptation resulted in the formation of a blue color square frame (positive afterimage) on a blank white screen.

The results show a significant effect of scope of spatial attention on afterimage formation. The onset of the afterimage that could be linked to the time taken to access the contents of consciousness was shorter with the small and global letter stimuli compared to the large and

local letter stimuli. The duration of the afterimage was longest for the small letter stimuli (focused spatial attention). The color appearance and clarity of the afterimage was also strongest for the small letter. There was a clear effect of spatial scope of attention on awareness with color and clarity of afterimages as dependent measures and an effect of object based attention (global vs. large) in the initiation of afterimages. The results indicate that there are significant differences in the way scope of attention affect the formation of negative and positive afterimages. The study indicates that theories on the relationship between attention and awareness must also take into account the specific attention and perceptual processes involved in the processing of specific stimuli.

Amrendra **SINGH**
Narayanan **SRINIVASAN**
Centre for Behavioural and Cognitive Sciences
Email: amrendra.singh@cbcs.ac.in
UNIVERSITY OF ALLAHABAD
Allahabad, India

Effect of Different Types of Mediation on Scope of Attention and Visual Awareness

Meditation training is broadly classified into two major sub-categories: *Open Monitoring* or *Mindfulness meditation* and *Concentrative meditation* depending on the way selective attention is manipulated during training. Concentrative meditation emphasizes focusing on one object whereas open monitoring meditation emphasizes being open and not focusing on a particular object. We proposed that these differences in scope of attention would result in differential tuning of attentional processes that depend on scope of attention. Previously we have shown that changes in scope of attention affect awareness, that is the duration of negative color afterimages. Given this relationship, we investigated the effect of two different types of meditation on the duration of afterimages to explore the change in attentional processes due to meditation. The scope of attention was manipulated using local, global, small and large stimuli. The participants (Sahaj Samadhi meditation group, Vipassana meditation group and Controls) performed the central task with small, large, local, or global letters and a blue square as an adapting stimulus in the experiment and indicated the onset and offset of the afterimage. We found larger afterimage duration with meditators especially with Sahaj Samadhi (concentrative) meditation. The pattern of afterimage durations as a function of scope of attention was also different for the two types of meditation indicating the differences in scope of attention due to different types of meditation training. The results also suggest that differential tuning of attentional processing results in changes in visual awareness as measured through afterimages.

Sonali Bhatt **MARWAHA**
Email: sonalibm@gmail.com
Visakhapatnam, India

Lights Out: The Disappearing Self

The experience of self and consciousness are among the most common experiences, which, however, defy adequate definition and pose a problem of understanding. These fundamental aspects of our existence have captured the attention of thinkers from eons past. Our experience informs us that the self exists at different levels of awareness, forming different aspects of our identity. We commonly identify two primary levels of the self: the biological self and the autobiographical self. Indian philosophy considers the self as distinguished from the body, breath, mind, and intellect, which cover the self like veils or sheaths. This is considered to be the true self. These various levels of self lead us to the next question of deciphering which self is primal: the transcendental, biological, or autobiographical self. The self is a fluid, dynamic organism, which we cannot compartmentalize. Each aspect is dependent on and influenced by the others. The understanding and concept of self is intrinsically linked to that of consciousness.

Based on my subjective experience of self under special conditions of absence seizures, grand mal seizures and atonic seizures, I explore the existence and concept of self and its relation to consciousness. In doing so, I address consciousness and self under various states, such as waking, dream and seizure and explore their phenomenological experiences. I take the readers through a journey of states of consciousness that many are privy to, and most are not. The experiences in these states are far more common than the mystical experiences of gurus; thus what can be learnt through them has the potential to take us a step forward in our quest to understand self and consciousness.

Atreyee **MUKHERJEE**
Department of Philosophy
Email: atreyee76@yahoo.com
WEST BENGAL STATE UNIVERSITY
Kolkata, India

Self - Construction

The question 'Who am I?' has surfaced and resurfaced again and again in the human mind and almost all academic endeavours are direct or indirect ways of addressing that question. In fact, this apparently simple query is directly related with one of the persistent issues of contemporary philosophy of mind and cognitive science- the problem of self. The notion of

self, our conception of 'who we are' is interlinked with all the major issues of philosophy but its immediate lineage can be traced back to the mind-body problem.

According to Galen Strawson, the problem of the self needs to be tackled at different levels. Before attempting a metaphysical or ontological exploration of the self, we must embark upon a phenomenological exploration of our sense of the self. Such a view is endorsed by J.N.Mohanty also. To quote Mohanty 'The suggestion is that we need not start with a conception of what the world must be like and then try to fit our concept of a person to that picture of the world. Rather, our concept of a person, gleaned at first from our direct attending to ourselves as persons, should contribute towards forming that picture of the world which we all aim at recovering in philosophy'. In fact Mohanty's quest for self-hood is not an epistemological or ontological quest rather it is a phenomenological quest. And thus it omits questions about how does one know or what sort of identity characterizes a person. Mohanty, on the other hand, talks about a direct encounter with self given in our 'direct attending' to ourselves as persons. In order to have any satisfactory theory about the nature the self, we must first know what kind of self we are looking for. In other words, we have to be clear about the sense of the self that is under consideration. This sense of self or in philosophical jargon, this phenomenology of self must be general enough to be accommodated by any theory of self. That is, this phenomenological sense of self must be a *minimalistic* one to be acceptable to one and all. Galen Strawson nicely formulates the phenomenological question regarding self as 'what is the nature of the sense of the self?' and sharply distinguishes it from the factual or metaphysical (ontological) question which stands as 'Is there (could there be) such a thing as the self?'. It is seen that an answer to the latter question is somehow dependent upon how we answer the former one. Hence it is insisted that unless we settle for a clear and unambiguous phenomenological sense of the self at the outset, we cannot proceed towards solving the ontological issue concerning the reality of the self.

Sukanya **RAY**
J. K. **KESHAV**
Neuropsychology Unit
Dept. of Clinical Psychology
Email: sukanya.ray7@gmail.com

HUMAN DYNAMIC ASIA PACIFIC and
NATIONAL INSTITUTE OF
MENTAL HEALTH AND NEUROSCIENCES
Bangalore, India

Cognition and Emotion: A Review

Cognition and emotion have been at the frontier of experimentation and debate since interest in localization of brain functions was sparked by the famous case of Phineas Gage. In the last

century, numerous attempts at localization of cognitive and affective functions had led to the conceptualization of cognition being restricted to the prefrontal cortex, while affective functions were in the domain of limbic or subcortical networks, thus popularizing the notion of *cognitive brain vs emotional brain*. Recent researches have time and again pointed out the non-exclusivity of these two functions, implicating the interconnections between cortical and subcortical pathways and thereby the interconnectedness of the neuropsychological correlates of emotion and cognition. Research in the last decade has concretized the notion, that neither the concept of equipotentiality nor the concept of localization correctly captures the complexity of brain functions underlying cognition and emotion. In the words of Gray et al. "…at some point of processing, functional specialization is lost and emotion and cognition conjointly and equally contribute to the control of thought and behavior". At the heart of the current notion of interconnectedness between cognitive and emotional centers is probably the functions of the amygdala, which has been reported of late. The amygdala is no longer important only for fear-processing or emotional memory. The amygdala is perhaps the most important subcortical structure which has twofold functions (Pessoa, 2010): deciding on "what is" a stimulus and deciding on "what to do" in response to the stimulus, thereby implicating its roles in attention, value representation and decision making. Another interesting finding regarding the possible role of NMDA receptors in the ventral hippocampus in reduction of anxiety via anxiolytics (Barkus et al., 2009), points to the dual functions played by different regions of the hippocampus. That this duality is a commonality is a finding which is being implicated by research in almost all areas of the brain previously thought to be restricted to a single function. This interconnectedness of cognition and emotion is important to understand how mental states are represented in the brain in normal and abnormal conditions and how shifts between mental states occur. The current work is a review of recent researches in the field, to integrate the findings of emotion and cognition, and the interconnectedness between the two.



Brief Biographies of SPEAKERS

Speakers for 5TH JANUARY 2012

Mani **BHAUMIK**

Mani Bhaumik is a physicist, international bestselling author, celebrated lecturer, entrepreneur, and a philanthropist. He is the co-inventor of the excimer laser that made the very popular *Lasik* eye surgery possible. For his pioneering research, he has been elected by his scientific peers as a fellow of the Institute of Electrical and Electronics Engineers as well as of the American Physical Society. He also received an honorary D.Sc degree for Lifetime Academic Achievements from his Alma Mater, Indian Institute of Technology, Kharagpur. He has published over fifty papers in professional journals and is a holder of a dozen US patents.

Dr. Bhaumik was born on a mud floor in a primitive village in West Bengal. In the midst of the struggle for Indian independence, education seemed to him the only way out of the black hole of poverty. He walked four miles barefoot to the nearest high school, enduring flood, famine and epidemic. As an impressionable teenager, he had an opportunity to live with Mahatma Gandhi in his camp, and to absorb lessons about “faith in action” that would always inspire him throughout his life. With mentors like Professor Satyendra Nath Bose, he eventually earned a Ph.D. in Physics from IIT, Kharagpur against all odds and came to UCLA for post doctoral studies with a Sloan Foundation Fellowship. Dr. Bhaumik arrived in Los Angeles, having just three dollars in his pocket. Utilizing earnings from his scientific career as a spring board for various investments, he was able to wipe off his poverty stricken past. His phenomenal success was featured in the syndicated TV serial, *Lifestyles of the Rich and Famous*. He then turned his considerable energy to the study of the hidden relationship between advanced science and spirituality. His intense search spanned a decade and published his lines of reasoning in the International Bestseller, *Code Name God*. Dr. Bhaumik is also the creator and executive producer of an award winning animated TV series, *Cosmic Quantum Ray*, that is scheduled for broadcast worldwide. It is designed to spark children’s interest in science. He is the recipient of many awards for his various philanthropic and community activities in India and the US. Dr. Bhaumik has recently authored a book on cosmology for young readers, entitled *The Cosmic Detective* that has been just published by Penguin, India. The organizers of the International Year of Astronomy under the auspices of UN through UNESCO has selected this book as an official product and will distribute a copy of the book to the global VIP participants of the opening ceremony in Paris on 15th January, 2009.

Benoy **CHAKRAVERTY**

Benoy Chakraverty did his undergraduate studies at Presidency College, Calcutta in the nineteen fifties. He got his Ph.D at Carnegie Tech, Pittsburgh USA in 1961. He then worked at IBM T J Watson Research Center in New York for the next several years and went to France in the late

sixties to join C.N.R.S, Grenoble where he has been ever since. He built the “Laboratory of Phase Transition” at CNRS that he directed for many years and also animated a condensed matter theory group. His own research interest has been in the domain of metal-nonmetal transition, disordered semiconductors and High Tc superconductors. He is Emeritus with CNRS.

P. Satish **CHANDRA**

Prof Satish Chandra is the Director-Vice Chancellor of NIMHANS and a senior Professor of Neurology. He obtained his D.M. (Neurology) from NIMHANS in 1982 and since then has worked as a faculty member in the Department of Neurology. During his career he has been granted several fellowships, including the ‘International Neuro-Sciences Fellowship’ at National Institute of Neurological Disorders and Stroke (NINDS), National Institutes of Health (NIH), Bethesda, USA for one year, sponsored by WHO-Fogarty-NIH. During this period he worked on Neuro-epidemiology and Epilepsy. He has also been a Senior Visiting Fellow’ at ‘Raymond Way Research Group’ at the Institute of Neurology, Queen Square, London, UK. Professor Satish Chandra’s main areas of research interest include Epilepsy and Neuro Infections including Neuro AIDS. He has conducted original research in various aspects of Epilepsy including Hot Water Epilepsy and in the area of Neuro-AIDS which has been recognized nationally and internationally. Developed ‘Comprehensive Epilepsy Surgery‘ programme at NIMHANS. He has been the Principal Investigator of an RO-1 grant on Neurological manifestation of HIV/AIDS granted by NIH, USA. In the area of Community Neurology, he has initiated the ‘Epilepsy Control Programme’ all over India and conducted several workshops with the support of WHO – SEARO, New Delhi. He has over the years been actively involved in creating awareness about epilepsy and removing the stigma of epilepsy among lay public, students and school teachers through various programmes under the aegis of the Indian Epilepsy Association (IEA).

Prof. Satishchandra has received several Awards & Prizes for his research and service initiatives. Prominent among these are - ‘Sir C.V.Raman Young Scientist Award’ by Government of Karnataka in 1997; Indian Council of Medical Research (ICMR) Award for outstanding research in Epilepsy, 1998; Fellow of Academy Medical Sciences (FAMS) by the National Academy of Medical Sciences, New Delhi, 2003 and Fellow of Indian Academy of Neurology (FIAN) in 1998. He has also received several awards for research papers presented at various international and national conferences. He has delivered a number of orations. Prominent among them are: ‘George Burden Memorial International Lecturer” at British Epilepsy Conference, Edinburgh, UK, March 2000; “Sarabai Oration” by Associations of Physicians of India, January, 1997. He has edited two monographs on ‘Epilepsy’ and one on ‘Techniques in Neuro Sciences’ and has 144 articles in various journals and 37 chapters/monographs. Teaching neurology to young students has always been one of his passions. He has held the following offices in various Professional Associations: President - Bangalore Neurological

Society (BNS) (2009 – 2011); Vice President - Indian Epilepsy Society (IES) (2010–2012); Treasurer, Indian Academy of Neurology (2003- 2008); President - Indian Epilepsy Association (Bangalore Chapter) (2007–08).

Ramanath **COWSIK**

Born in 1940 to Smt Saraswathi and Sri Rama Krishna Cowsik, as the second of five siblings, Ramanath Cowsik had his education from the Mysore University, and the Karnataka University. After a year's study at the Atomic Energy Training School, he joined the Tata Institute of Fundamental Research (TIFR), Mumbai, for his Ph.D under the supervision of Prof. Yash Pal. Subsequently he served in the Physics Department, University of California, Berkeley, as Assistant Professor and Max Planck Institute fur physik and astrophysik, Garching, Munich, as senior visiting fellow, before he returned to TIFR as a member of the faculty and became a Distinguished Professor. He was on lien from TIFR as Director, Indian Institute of Astrophysics (IIA), Bangalore, for the period 1994-1999, and took up the responsibility of setting up the Hanle Telescope. Upon successful completion of this project, he moved to the Physics Department, Washington University in St. Louis and is now concurrently the Director, McDonnell Center for the Space Sciences. The seminal path-breaking contributions of Cowsik encompass almost every aspect of high energy astrophysics, neutrino physics, astroparticle physics, gravitation and cosmology and influenced the development of these areas of research significantly. His 'leaky-box' and 'nested-leaky-box' models of cosmic rays have been extensively used in interpreting observation. His detailed calculations on the fluxes of neutrinos generated by cosmic-ray interactions in the atmosphere later led to the discovery of neutrino oscillations at Kamiokande. His proposal of weakly interacting massive particles as the possible dark matter candidates and the possible contributions of massive neutrinos to the density of the universe that provided the 'Cowsik-McClelland bound' on the neutrino masses, started new era in particle physics and cosmology.

In addition to his contributions in theoretical physics, he performed several outstanding experiments in cosmic rays, he set up the highest observatory at Hanle, Ladakh, performed precision measurements of gravitational interaction by constructing sensitive torsion balances and using them to study Einstein's equivalence principle and to search for new fundamental forces and latterly applying them for detection of seismic waves. He measured the longest radioactive half-life ever, of the double beta decay of Te^{128}. He has had a long-standing interest in vedantic philosophy in the religions of the world and in the Science-Religion dialogue. He has participated in a variety of activities of the John Templeton Foundation, including being on their Advisory Board. The works of Cowsik have been recognised through several prestigious awards, including the S.S. Bhatnagar Award, Vikram Sarabhai Award for Space Sciences, M.N. Saha Birth Centenary Award, C.V. Raman Memorial Lecture Award of the IAS, Vaina Bappu Memorial Award of the INSA, NASA Public Service Group Achievement Award, Regents' lectureship of the University of California, The TWAS Award in Basic Sciences,

M.P. Birla Award, Jawaharlal Nehru Birth Centenary Lecture of INSA, and so on. He has been members of many important scientific committees, including that of the National Academies in India and the National Science Foundation (NSF). He is an elected fellow of all the three National Academies in India, and also a fellow of the TWAS, the academy of the developing countries. He has been decorated by one of the highest civilian awards from the President of India, the Padma Shri Award by the Government of India, and the Fellowship of the National Academy of Sciences, USA.

Stuart **HAMEROFF**

Stuart Hameroff MD is Professor of Anesthesiology and Psychology, and Director of the Center for Consciousness Studies at the University of Arizona in Tucson, Arizona. A clinical anesthesiologist at University of Arizona Medical Center, Hameroff's academic research has focused on how the brain produces consciousness, suggesting an essential role for computation in protein polymers called microtubules inside brain neurons. In the mid 1990s Hameroff teamed with British physicist Sir Roger Penrose to develop the Orch OR theory, attributing consciousness to microtubule quantum computations connected to processes in fundamental spacetime geometry, or quantum gravity. Hameroff also organizes the interdisciplinary conferences 'Toward a Science of Consciousness", promoting diverse approaches to the study of conscious awareness. His research website is www.quantumconsciousness.org

Mayank R **MEHTA**

Mayank R Mehta did PhD in Quantum field theory and worked on understanding the relationship between quantum fluctuations and the dimension of space-time. His subsequent work has focused on understanding the neural mechanisms of perceiving space and time. This is a part of more general problem, namely to understand the role of cellular properties in governing interactions of ensembles of neurons, and how cognition emerges from the *emergent* neural dynamics of neural networks. He uses a combination of *in vivo* electrophysiology of ensembles of single units from multiple brain regions, whole cell measurements *in vivo*, sophisticated data analysis methods, computational modeling, and analytical theories to address these questions.

This close combination of theory and experiments has been fruitful. Using this, we have discovered the phenomenon of 'place cell plasticity' which provides one of the strongest evidence for Hebbian, NMDAR-dependent synaptic plasticity during behavior. We have demonstrated a simple, physiological mechanism by which neurons can generate a robust temporal code and the precise spike timing required to induce synaptic plasticity during behavior. Finally we have shown large and surprising cortico-hippocampal interaction during the slow-wave-sleep oscillations that could influence place cell plasticity and long-term memory

formation. Our recent research has provided a biophysical theory of pattern of synaptic plasticity induced by natural spike patterns to reveal a novel and profound influence of brain rhythms on learning. We have also discovered a novel mechanism by which brain rhythms could encode running speed. These studies have been funded by the NIH, NSF, W. M. Keck foundation and the Whitehall foundation.

V S **RAMAMURTHY**

V S Ramamurthy is a well known Indian nuclear scientist with a broad range of contributions from basic research to science administration. Prof. Ramamurthy started his career in Bhabha Atomic Research Centre, Mumbai in the year 1963. He has made important research contributions, both experimental and theoretical, in many areas of nuclear fission and heavy ion reaction mechanisms, statistical and thermodynamic properties of nuclei, physics of atomic and molecular clusters and low energy accelerator applications. During the period 1995-2006, Prof. Ramamurthy was fully involved in science promotion in India as Secretary to the Government of India, Department of Science & Technology (DST), New Delhi. He was also the Chairman of the IAEA Standing Advisory Group on Nuclear Applications for nearly a decade, Chairman, Board of Governors, Indian Institute of Technology, Delhi, Member, National Security Advisory Board and Chairman, Recruitment & Assessment Board, Council of Scientific and Industrial Research. After retirement from government service, Prof. Ramamurthy, in addition to continuing research in Nuclear Physics in the Inter-University Accelerator Centre, New Delhi, has also been actively involved in human resource development in all aspects of nuclear research and applications. He is currently the Director, National Institute of Advanced Studies in Bangalore, and Chairman, Board of Governors, National Institute of Technology, Hamirpur. In recognition of his services to the growth of Science and Technology in the country, Prof. Ramamurthy was awarded one of the top civilian awards of the country, the Padma Bhushan, by the Government of India in 2005.

Shobini L **RAO**

Shobini L Rao is working as Professor of Clinical Psychology at the National Institute of Mental Health and Neurosciences, Bangalore, India. The responsibilities include Clinical work, teaching and research. She has a Ph.D. in Psychology from Delhi University. She worked with Prof. Paul Fraisse at the Univeriste Rene Descartes in Paris between 1978-80. After joining NIMHANS as faculty in 1982 she has been specializing in Neuropsychology including Neuropsychological assessment and Neuropsychological Rehabilitation. She has worked extensively in neuropsychological assessment of patients with head injury, Refractory epilepsy, Brain Infections including HIV and Schizophrenia. She and her collaborators have developed and formed Neuropsychological battery for adults with containing 19 internationally used tests for the Indian condition as well as a Neuropsychological battery for Head Injury. Her doctoral students have developed Neuropsychological battery for children, for refractory

epilepsy and for persons with HIV. She has developed a computerized cognitive retraining program for head injured patients in the 1980s which has been modified as a paper pencil based retraining program in the 1990s. In the new millennium she has developed a home based cognitive retraining program for head injury which was modified for schizophrenia by her doctoral student.

The other focus of her research has been Cognitive Neuroscience. Between 1994-95 she was invited as Visiting Professor at the University of Texas Health Sciences Center at San Antonio, USA and worked with Prof Peter Fox on PET and fMRI of language processing. She set up the first high density EEG laboratory in the country in 2001 under a grant from the Dept. of Biotechnology. She was invited to function as Senior Professor at the National Brain Research Center and help to set up the fMRI facility there. Since 2009 she has been actively involved in two multi institutional and multi disciplinary projects under the Cognitive Science Initiative of the Dept. of science and Technology, GOI. Under this grant she has set up a FMRI facility at NIMHANS to be used as a National facility. Her research interests are Changes in brain activity after cognitive retraining, Capacity limits of information processing, Brain organization in normative Bilingualism and Multilingualism, Generativity in Cognitive Networks.

Sisir **ROY**

Sisir Roy is Professor of Physics and Applied Mathematics Unit and Professor-in-Charge, Physics and Earth Sciences Division, Indian Statistical Institute, Kolkata, India. He has visited many universities in Europe and USA as visiting Professors and delivered many invited and keynote lectures at various institutes and universities in India, Europe and USA. His research interest includes Foundations of Quantum Mechanics, Theoretical Astrophysics and Cosmology, Modeling Brain Function and Consciousness. Published more than 100 papers in peer reviewed international journals and nine research monographs and edited volumes. Recently published a book on Planck Scale Physics and its epistemological problems: "Demystifying the Akasha : Consciousness and Quantum Vacuum ": Rlaph Abraham and Sisir Roy, Epigraph, New York, 2010. Act in various editorial boards of journals and book series.

B V **SREEKANTAN**

B V Sreekantan received the PhD (1954) from the University of Bombay. He was Director, Tata Institute of Fundamental Research, Mumbai (1975-87) and INSA Srinivasa Ramanujan Research Professor (1987-92). Sreekantan's research encompasse three distinct but related areas of fundamental science, viz. cosmic rays, elementary particles, and high energy X-ray and y-ray astronomies. He carried out deep underground experiments in Kolar Gold Field (KGF), cloud chamber studies of cosmic ray interactions at Ooty; X-ray, gamma-ray astronomy experiment: with balloons from Hyderabad and rockets from TERLS and SHAR. He also made extensive air

shower experiments at Ooty and KGF. He has published over 200 research papers. His current interests are in Philosophy of Science and Scientific and Philosophical studies on Consciousness.

Prof B V Sreekantan is currently Visiting Professor at NIAS; Chairman, Gandhi Cetre of Science and Human Values of the Bhavan, Bangalore. He was an Editorial Fellow of the Project of History of Indian Science, Philosophy and Culture (PHISPC) and the Indian National Science Academy Srinivasa Ramanujan Professor during 1987-92. He was Visiting Scientists/Visiting Professor at several universities in the US and Japan. Sreekantan was Vice-Chairman, IUPAP Cosmic Ray Commission (1987-93), and Chairman, Governing councils of SAMEER, Indian Institute of Astrophysics and Research Council, National Physical Laboratory, and others. Professor Sreekantan was conferred Homi Jahangir Bhabha Medal of INSA (1978), CV Raman Award by UGC (1977), RD Birla Award by Indian Physics Association (1982), Ramanujan Award, Indian Science Congress (1989), Padma Bhushan (1988), UGC National Lecturer and PMS Blackett Memorial Lecture Award by INSA-the Royal Society (1978). He was elected Fellow of the Indian Academy of Sciences, Bangalore; Indian National Science Academy, Delhi and Maharashtra Academy of Sciences. He is also the recipient of Sir M. Visveswaraya Senior Scientist State Award and also *Rajyotsava Award,* Government of Karnataka.

R. **SRIKANTH**

R. Srikanth is an Assistant Professor of the Poornaprajna Institute of Scientific Research (PPISR), Bengaluru. His areas of interest are Quantum information theory, especially cryptography; the entropic approach uncertainty principle: number-phase uncertainty; Open quantum system effects in quantum information theory: the squeezed generalized amplitude damping channel; two-qubit noise processes; Foundations of quantum mechanics: Understanding physics from an information and computation theoretic perspective: exploring the relationship between quantum speed-up and complexity of states; that between nonlocality and uncertainty; deriving quantum physics from computational or physially inspired axioms; Philosophy of Science: free will, and its implications for physics and neuroscience; in quantum physics: Individuation & identity; ontic vagueness vs. epistemic uncertainty vs. semantic indecision. He did his Ph.D. in Solar physics (1999) from the Indian Institute of Science (IISc), Bengaluru; B.E, in Chemical Engineering (1991)from Birla Institute of Technology and Science (BITS), Pilani, Rajasthan. His professional experience include: May, 2009: Assistant Professor in physics at PPISR; September 2006: Faculty fellow in Physics in Poornaprajna Institute of Scientific Research, Bangalore; From May 2003 - August 2006-: As post doctoral fellow in the Light and Matter Physics group of RRI Bangalore; From January 2002 - April 2003: Research Associate at Center for Theoretical Studies, IISc in Quantum Communication as part of DST sponsored program on mathematical engineering; From January 2000 - December 2001: Postdoctoral fellow at IIA, Bangalore. He has published 42 papers in peer-reviewed international journals and participated in many conferences. Over the years, he has taught physics (quantum mechanics, quantum

information theory, quantum computation, geometric phases), programming (C++, VisualPython) and French mainly to undergrads and graduate students.

Speakers for 6TH JANUARY 2012

Ikuma **ADACHI**

Ikuma Adachi is an Assistant Professor in the Center for International Collaboration and Advanced Studies in Primatology (CICASP) in Primate Research Institute (PRI) at Kyoto University. He earned his PhD at the Department Psychology at the Kyoto University, where he studied concept formation and multisensory integration in non-human animals. Following his PhD, he completed a postdoctoral research fellowship at the Yerkes National Primate Research Center, where he studies social representation in rhesus macaques such as face perception, cross-modal representation, and dominance relationship. In 2009, Dr. Adachi worked at Language and Intelligence Section at Primate Research Center at the Kyoto University, where he focusing on cognitive abilities mainly in Chimapnzees. From 2010, Dr. Adachi moved to the CICAPS, which newly launched in the PRI, and is now working on non-human primate social and non-social cognitions as well as on internationalization of the PRI.

S P **ARUN**

S P ARUN received his B.Tech degree from IIT Bombay and M.S and PhD degrees from Johns Hopkins University, all in Electrical Engineering. He then completed his postdoctoral work at Carnegie Mellon University. Since 2010, he is an Assistant Professor at the Centre for Neuroscience at IISc Bangalore.

JOSEP **CALL**

Josep Call is co-founder and director of the Wolfgang Köhler Primate Research Center at the Max Planck Institute for Evolutionary Anthropology (MPI-EVA), and a senior scientist at the department of Developmental and Comparative Psychology of the MPI-EVA. He holds a Bachelors degree in Psychology from the Universitat Autonoma de Barcelona and Masters and Doctorate degrees from Emory University. Prior to joining the MPI-EVA, he was a lecturer at the School of Biological Sciences at the University of Liverpool. He has published two books and more than 200 refereed papers and book chapters on the behavior and cognition of apes and other animals. He has presented his work on numerous occasions at international conferences. He is the incoming editor of the Journal of Comparative Psychology and a member of the editorial board of several other academic journals.

Robert **HAMPTON**

Robert Hampton is an Associate Professor of Psychology at Emory University, and an Associate Research Professor in Developmental and Cognitive Neuroscience at the Yerkes National Primate Research Center. Following his doctoral research at the University of Toronto, where he studied spatial memory and food storing in birds, he completed a postdoctoral research fellowship at the National Institutes of Mental Health, where he studied the neural mechanisms of learning and memory in monkeys. Dr. Hampton directs the Laboratory of Comparative Cognition where he collaborates with his students and postdocs to investigate the behavioral and neural components of cognitive competencies across primate species. Recent publications from his research with monkeys include reports on recall memory, social dominance detection from videos, face perception, metacognitive awareness of animals' own memories, and the neurocognitive bases of habits and memories. Professor Hampton's laboratory has been funded by the Center for Behavioral Neuroscience, the National Science Foundation, the National Institutes of Health, and the James S. McDonnell Foundation.

Malavika **KAPUR**

Dr. Malavika Kapur was the Professor and Head of the Department of Clinical Psychology at the National Institute of Mental Health and Neurosciences, Bangalore. She has a Ph.D. in Clinical Psychology from Bangalore University and has eight books and over 100 publications to her credit. She is a Fellow of the British Psychological Society, the Indian Association of Clinical Psychologists, the Indian Association of Child and Adolescent Mental Health and the National Academy of Psychology. She has been a consultant for organizations such as the WHO, UGC, NCERT, IPCCD, ICMR and ICSSR. She has been twice awarded the scholar in residency at the Study and Conference centre, at Bellagio in Italy, by the Rockefeller Foundation. Her areas of interest are Developmental Psychology, Community Mental Health Programmes for Children and Adolescents in Urban and Rural Schools, and Development of Assessment Tools and Intervention Packages for Children and Adolescents in the Indian Context.

Her main contribution is her work of developing integrated models of mental health service delivery for children and adolescents. Her work is embedded in the cultural context as revealed in her Study of Child Care in Ancient India based on Ayurveda. Her other interests are fiction writing and trekking in the foothills of the Himalayas.

Rajesh **KASTURIRANGAN**

Rajesh Kasturirangan is an Associate Professor at National Institute of Advanced Studies. His research interests are in cognitive science and philosophy of mind. His current work relates to applying a combination of philosophical argument, mathematical techniques and empirical observations to classical problems in cognitive science and the philosophy of mind such as

the semantics of natural languages, the epistemology of beliefs and the structure of intentionality and consciousness. His most significant research contribution has been to develop a computational theory of how language and concepts are grounded in the world.

Anil **SETH**

Anil Seth is a Reader (Associate Professor) in the Department of Informatics at the University of Sussex, co-director of the Sackler Centre for Consciousness Science, and an EPSRC Leadership Fellow in computational neuroscience. He has a BA (MA) in Natural Sciences from the University of Cambridge (1^{st} class, 1994,1998); an M.Sc. in Knowledge-Based Systems from the University of Sussex (distinction, 1996), and a D.Phil. in Computer Science and AI also from Sussex (2001). From 2001-06 he conducted postdoctoral research in the area of theoretical neurobiology at The Neurosciences Institute in San Diego, after which he returned to the faculty at Sussex. He has published more than 50 journal papers, 1 book, and many other peer-reviewed publications in many areas of neuroscience, cognitive science, and artificial intelligence. He is Chief Editor of *Frontiers in Consciousness Research* and associate editor of *Adaptive Behaviour* and *Cognitive Computation*; he also edits the Consciousness chapter of Scholarpedia. He is overall programme chair for the 16^{th} Meeting of the Association for the Scientific Study of Consciousness Science (ASSC16) to be held in Brighton in July (2-6) 2012 (http://www.theassc.org/conferences/assc_16). Research in his group integrates mathematical, theoretical, and experimental approaches to unravelling the neural mechanisms underlying consciousness, in humans and other animals, and in health and in disease. A second and complementary interest lies in developing statistical approaches to causal inference in complex network dynamics. For more details please visit www.anilseth.com and www.sussex.ac.uk/sackler.

Anindya **SINHA**

Anindya Sinha is a Professor at the National Institute of Advanced Studies. He received his PhD from the Tata Institute of Fundamental Research, Mumbai and joined NIAS on 15^{th} November 1996. Dr Anindya Sinha's wide-ranging research interests are in the areas of behavioural ecology and cognitive psychology of primates, animal molecular genetics, evolutionary biology, conservation biology and the philosophy of biology. He has a master's degree in botany, a doctorate in molecular biology, and has earlier worked on the biochemical genetics of yeast, the social biology of wasps, and the classical genetics of human disease. His most significant research contribution has been in the discovery of a new species of primates, the Arunachal macaque, in northeastern India although principal contributions have been in understanding the structure and evolution of the primate mind. He is also interested in biology education and popularisation of science, and has lectured extensively in a variety of educational and research institutions.

Milind **WATVE**

Milind Watve has a basic training in microbiology and worked on wildlife ecology for a PhD. He continued as an undergraduate teacher at Abasaheb Garware College Pune until 2009 and is currently a Professor of Biology at IISER, Pune. Milind Watve uses research more as a tool in education and tries to motivate undergraduates to identify novel problems and use a variety of tools to handle them including modeling, simulations, observations, surveys, meta-analysis, field experiments as well as lab experiments. Since students come with a variety of interests and aptitudes, while catering to them he got involved in diverse research areas including bacterial cell division, predatory bacteria, behavior of plasmids, behavior of mitochondria, diseases of wild animals, behavior and infectious diseases, pollination biology, social behavior, animal cognition, sex, human behavior and health. Nevertheless there is a common theme that runs through all the work, the connecting thread being evolutionary biology. Areas of current interest include evolutionary origins and basic biology behind type 2 diabetes and other age related conditions, Bacterial life in calorie restricted environments, aging in bacteria, ecology and evolution of secondary metabolites of Actinomycetes, the origin and stability of cooperation, and issues of human-wildlife conflict.

Speakers for 7TH JANUARY 2012

Gautam **CHATTERJEE**

Gautam Chatterjee is a teacher, and founder of Kashi Shaivism through Consciousness studies. An oft-quoted author of various books and president of Abhinavagupta Academy (a Centre for Consciousness Studies in Arts, Science and Philosophy), Prof. Chatterjee has a lineage of Pandit Ishvarchandra Vidyasagar (great grandson from mother side) and Pandit Suniti Kumar Chaturjya (grandson) with deep Sanskrit tradition and has been a close associate of Thakur Jaidev Singh. He was first initiated by Pt. Gopinath Kaviraj, now teaches consciousness in terms of Kashmir Shaivism and aesthetics in terms of Natyashastra in equal grace. Presently, he is translating the entire text of Tantraloka, the *magnum opus* by Acharya Abhinavaguptapad, direct from Sanskrit into English for the first time. Three volumes have been published in the light of his guru in Sanskrit and Agam, Pt. Vrajavallabha Dwivedi. His other concerned areas are Hermeneutics, poetry and Indian classical music. He has translated into English the major portions of Natya Shastra, Brihaddesi, Abhinava Bharati, Sangit Ratnakar, Guhyasamaj Tantra, Prapanchasaratantra, Tantratattvapraveshika and for the first time 'Gyanaganj'by Pt. Gopinath Kaviraj. He has coined Abhinavagupta Hermeneutics and Emotion Semiotics (in music, dance and acting). His latest books 'Consciousness', and 'Indian Hermeneutics' are in press. After completing his study on the inter-influence of Indian classical music and Agam, he is studying in the philosophy of Indian hermeneutics.

He communicates through theatre, music and film, has made a short fiction film titled 'Green Room' and a documentary on Badal Sircar. At present, stays in Varanasi (India) and teaches in Banaras Hindu University as an Adjunct Professor of conscious communication. Apart from numerous research paper presentations in various institutes and institutions, he has especially been invited to deliver a special lecture on World Philosophy Day (15th November) declared by Unesco on the birth anniversary of Socrates organized by the department of Philosophy, University of Calcutta, last year. This year, in March, he taught consciousness in aesthetics in 'Abhinavagupta Study Week' organized in Indian Institute of Advance Studies, Shimla. His research papers, presented in the department of Philosophy, University of Pune, Jadavpur University, Rabindra Bharati University and Asiatic Society, Kolkata, University of Lucknow, University of Mumbai, University of Sagar and Punjabi University, Patiyala have been regarded as the original works in the newer area of consciousness. Recently he staged two plays on Tagore and Malviya ji as the expanded consciousness in socio-cultural milieu. At present he is also busy with the interpretation of Sandhi Nirmochan Sutra in Buddhism and Shiva Sutra in Kashmir Shaivism. And now he is invited in Athens in 2013 for the world congress of Philosophy.

Philip **CLAYTON**

Philip Clayton is Provost of Claremont Lincoln University and Dean of Claremont School of Theology, where he is Ingraham Chair of Theology. He received a joint doctorate in philosophy and religious studies from Yale University. Since that time he has written or edited some 22 books and several hundred articles in the field. His previous teaching posts include Williams College and the California State University; he has also held invited guest professorships at the University of Munich (two years), the University of Cambridge, and Harvard University (also two years). Clayton has written or edited some twenty books on topics in religion and theology, as well as philosophy of science, philosophy of mind, history of philosophy, and the philosophy of religion. Within the natural sciences, Clayton's research has focused on emergent dynamics in biology and on the neural correlates of consciousness in neuroscience. He has co-authored or edited a number of publications with physicists, chemists, and biologists, analyzing emerging natural systems and exploring their significance for the study of religion. He is perhaps best known for his work in exploring the philosophical and religious implications of emergence theory, published as *Mind and Emergence: From Quantum to Consciousness; The Re-Emergence of Emergence; In Quest of Freedom: The Emergence of Spirit in the Natural World*; and *Adventures in the Spirit: God, World, Divine Action*.

In addition to his own publications, Clayton has been a leading advocate for the internationalization of the science-religion dialogue. As Principal Investigator for the "Science and the Spiritual Quest" program and as senior advisor and judge for the "Global Perspectives in Science and Spirituality" program, both funded by the Templeton Foundation, he has been

at the forefront of efforts to expand support for this field beyond the Western traditions. His other book publications as author or editor include *The Problem of God in Modern Thought; God and Contemporary Science*; *Explanation from Physics to Theology: An Essay in Rationality and Religion*; *Quantum Mechanics; Evolution and Ethics: Human Morality in Biological and Religious Perspective; Science and the Spiritual Quest*; *Transforming Christian Theology: For Church and Society;* and *The Predicament of Belief: Science, Philosophy, Faith*.

Natalie **DEPRAZ**

Natalie Depraz is Professor of Philosophy (German Idealism and phenomenology) at the University of Rouen, Director of the Department of Philosophy, Member of the Interdisciplinary Research Team ERIAC and Member of the Scientific Counsel; Member of the Husserl-Archives (ENS/CNRS); Director of the Research ANR Interdisciplinary Program Emphiline ("Surprise as emotion") (2012-2015) and more broadly of the Cognitive Sciences and Phenomenology Research Program and Associate Member at the CREA (Center for Research in Applied Epistemology, Paris).

Sangeetha **MENON**

Sangeetha Menon is a philosopher-psychologist working in the area of consciousness studies and Indian psychology. She works as Professor at the National Institute of Advanced Studies, in the Indian Institute of Science campus in Bangalore. Her published work that span about 18 years have highlighted the importance of understanding the nature of complex experiences in the light of global humanistic values such as well-being and personal growth. Her recent publications focus on a comparative study of emotions, nature of agency and primacy of experience. Her latest publication in The Journal of Transpersonal psychology argues for altruism as a fundamental value that drives human actions. She is a distinguished member of the International Society for Science and Religion whose 100 plus invited members, include Nobel laureates. She is a Board Member of the International Association for Transpersonal Psychology, and Asia Consciousness Society. Dr. Menon has co-edited four books. Dr Menon has visited and spoken at many Universities in her country, United States, London, Oxford, Germany, Paris, Rome, Spain, Melbourne, Japan, Taiwan, Singapore and Moscow. She was a Visiting Professor at the Oxford Centre for Hindu Studies (OCHS), Oxford University (Trinity Term, 2007), and at the Nanzan Institute of Religion and Culture, Nanzan University, Japan (Fall, 2007). She was invited to be a panelist at the World Parliament of Religions, Melbourne 2009. Apart from her academic interests she writes poetry, and is an avid photographer, artist and web-designer. For further details see www.samvada.com and www.consciousnesshop.com

Anand **PARANJPE**

Anand Paranjpe obtained his PhD in psychology from Pune University in 1967. After a year of post-doctoral research at Harvard University he worked at Simon Fraser University in Canada till 2001. His current position is Professor Emeritus, Psychology and Humanities at Simon Fraser University. His work in psychology is focused mainly on the understanding of psychological principles embedded in traditional Indian thought, mainly in the systems of the Advaita Vedanta and Yoga. He has authored a few books and numerous book chapters and papers. The main ones among his publications are "Self and Identity in Modern Psychology and Indian Thought (New York, Plenum, 1998) and "Theoretical Psychology: The Meeting of East and West" (New York, Plenum, 1984). He is co-editor with K.R. Rao and Ajit Dalal of the "Handbook of Indian Psychology" (Cambridge University Press, India, 2008). His academic honours include a Smith-Mundt and Fulbright award for post-doctoral research at Harvard University in 1966-67, and his election as Fellow of the Canadian Psychological Association in 2004, and Fellow of the National Academy of Psychology, India, in 2008. He was invited to be the National Visiting Professor in India by the Indian Council of Philosophical Research in 2011.

Nilanjana **SANYAL**

Nilanjana Sanyal is Professor and Former Head of the Department of Psychology, University College of Science, Technology & Agriculture, University of Calcutta, Kolkata. Her professional experiences are teaching in Calcutta University for the last 29 years; practicing Psychodynamic Psychotherapy and Psychoanalysis for the last 29 years; imparting training in Counselling in various Governmental Institutions and N.G.O.s. nationally and internationally; consistently involved in Mass Media Programmes like Radio, F.M.Channel; Television for awareness-generation regarding mental health issues; a columnist in different National dailies and magazines; speaker in a number of Seminars and Workshops at the National and International level; reviewer of different psychological projects at the National and International level; has delivered a number of Memorial Lectures at the National Level. Her research experience involves work on 'Value pattern of college students and its relation to certain psychosocial variables' for her PhD (1982) and has later emerged as a Guide for a significant number of students in the Ph.D programme. Her research interests are Personality and clinical psychology, interpersonal relationships, and psychodynamic psychotherapy. She is a member of the International Psychoanalytical Association; life member of Indian Science Congress; affiliate member of Indian Psycho Analytical Society; life member of Calcutta University Alumni Association; life member of Indian Psychiatric Society; life member of Indian Association of Private Psychiatry; member of the Editorial Boards of a number of Journals of Psychology.

She has received many awards including National Merit Scholarship at H.S. Examination, Undergraduate and Post Graduate Levels for academic excellence; 'Bhanu Dutta Memorial Medal' from Calcutta University for securing first position in B.A. Examination, 1974; Jubilee

Merit prize from Government of India in 1974 for academic excellence in B.A. Examination; Jawaharlal Nehru Award from Government of India for academic accomplishments in 1974; N.N. Sengupta Memorial Prize from Calcutta University for securing first position in M.A. Part - I Examination in 1975; the Calcutta University Gold Medal for excellence in academics at Post Graduate level in 1976; Suhashini Basu Memorial Prize in 1991 from Indian Psychoanalytical Society for excellence of a research paper; “Third Spot Award Prize” in 2006 at the 19th Annual State Conference of Indian Psychiatric Society (IPS), West Bengal State Branch, ASCIPS at Thakurpukur, Kolkata – 700014 for excellence of a research paper. Nilanjana Sanyal has published more than 92 scientific papers published in National and International journals till date and 13 book chapters at the national and international level.

Shridhar **SHARMA**

Shridhar Sharma is MBBS, MD, DPM, FRCPsy. (Lond.), FRANZCP (Australia), FAMS, FAPA (USA) and Emeritus Professor in Psychiatry, National Academy of Medical Sciences (NAMS) of India. He is an internationally and nationally recognized medical leader in the field of Psychiatry with expertise in the area of Social Psychiatry, Health Policy, Medical Education and Planning and a strong advocate of human rights of mental patients. Currently, he is Senior Advisor, World Association of Social Psychiatry (WASP) and a Board Member of World Federation of Mental Health (WFMH). In the past he has occupied significant positions in both Academic and Administrative fields at national level. He was the Director of the Institute of Human Behaviour & Allied Sciences, Government of Delhi (1993-96), Additional Director General of Health Services in the Ministry of Health, Government of India (1991-93), former Director, Post Graduate Institute of Medical, Education and Research, Chandigarh (1990-91), Medical Superintendent, Safdarjung General Hospital, New Delhi (1986-88), and Director & Professor, Central Institute of Psychiatry, Govt. of India, Ranchi (1981-86). He was also Professor & Head Dept. of Psychiatry Goa, Medical College from 1968-81. Professor of Psychiatry, Medical College, Baroda (1965-68). He was Hony. Physician to the President of India (1989-93). Shridhar Sharma was also Vice President, Development, WFMH and Vice President, Albert Schweitzer World Academy of Medicine, Formerly President World Association of Social Psychiatry (WASP) (2001-2004), (2006–2008), Chairman, Board of Trustees, World Association for Social Psychiatry (2004-07), was President of Indian Psychiatry Society (1985-86), Indian Association of Social Psychiatry (1986-87) and Chairman of World Psychiatric Association, Review Committee (1983-89) and was founder Secretary, “Conflict Resolution and Conflict Management Committee” and former Vice Chairman of Interdisciplinary Committee and other Committees of the WPA.

He was also Vice president of the World Association of Psychosocial Rehabilitation and Vice President, Development, WFMH. He has represented India in many international meetings including WHO and UN and has worked as a short term WHO consultant and WHO Advisor for

more than two decades. Besides he has been a member of expert groups of Indian Council of Medical Research, Indian Council for Agricultural Research and Council for Scientific and Industrial Research in India and visiting Inspector, Medical Council of India and consultant to National Human Rights Commission and Department of Ocean Development. He is the only Psychiatrist who was a member of the Cabinet Sub-committee, Governemnt of India on Drug Abuses, International Advisory Committee of WHO collaborating center of McGill University in Canada 1983-2001, International Scientific Committee on Antarctica Research (1989-92), Polish Academy of Medical Sciences and many other International and National Scientific Societies. He is the recipient of many national and international awards including Dr. B.C. Roy National Award for developing Psychiatry as a discipline in India in 1981. Dr. Sharma has published 9 books/monographs and over 200 scientific papers and has contributed immensely in the field of Social Psychiatry, Psychosomatic diseases, Psychopharmacology, Antarctica Research, Health & Mental Health aspects of Island, Coastal zone, Desert Health and Disaster Management and Medical Education and Ethical issues. He was bestowed with the Honorary Membership of the World Psychiatric Association and World Association for Positive Psychotherapy in recognition of his achievements, contribution and leadership in the field of psychiatry and for making extraordinary efforts to promote the status of psychiatry, disseminating psychiatric knowledge as well as for his concern for the welfare of mental patients.

Jonathan **SHEAR**

Jonathan Shear was a Woodrow Wilson Fellow in philosophy at the University of California at Berkeley, where he received his Ph.D., and a Fulbright Scholar in philosophy of science at the London School of Economics. Since the early 1960's his work, complimented by daily practice of Eastern experiential procedures, has focused on implications of basic meditation experiences for Western philosophy and psychology. Prof. Shear was a founding faculty member of Maharishi International University in 1971 and served as chair of its philosophy department for a dozen years. Currently he is an Associate Professor of Philosophy at Virginia Commonwealth University, where he has taught for 25 years. He has published and lectured widely in the United States, Europe, India and China, and was the founding Managing Editor of the J. of Consciousness Studies. Books include The Inner Dimension: Philosophy and the Experience of Consciousness (Peter Lang, 1990), Explaining Consciousness: the Hard Problem (MIT Press, 1997), The View from Within, co-edited with Francisco Varela (Imprint Academic, 1999), and The Experience of Meditation: Experts Introduce the Major Traditions (Paragon House, 2006).

Max **VELMANS**

Max Velmans has been involved in consciousness studies for around 35 years, and is currently Emeritus Professor of Psychology, Goldsmiths, University of London, Visiting Professor in Consciousness Studies, University of Plymouth, Indian Council of Philosophical Research National Visiting Professor for 2011, and an Academician of the Social Sciences. His main research focus is on integrating work on the philosophy, cognitive psychology and neuropsychology of consciousness. He has around 100 publications and has given over 150 national and international invited lectures on this topic. His book *Understanding Consciousness* (2000), was short-listed for the British Psychological Society book of the year award in 2001 and 2002, and is now in its second (2009) edition. Other publications include *The Science of Consciousness: Psychological, Neuropsychological and Clinical Reviews* (1996), *Investigating Phenomenal Consciousness: New Methodologies and Maps* (2000), *How Could Conscious Experiences Affect Brains?* (2003), and *The Blackwell Companion to Consciousness* (2007). He was a co-founder and, from 2004-2006, Chair of the Consciousness and Experiential Psychology Section of the British Psychological Society.



Contact ADDRESSES

Contact Addresses of Speakers and Chairpersons

Ikuma **ADACHI**
Center for International Collaborations and Advanced Studies in Primatology(CICASP)
Primate Research Institute
Kyoto University, 41-2 Kanrin
Inuyama, Aichi, 484-8506, Japan
Email: adachi@pri.kyoto-u.ac.jp

S P **ARUN**
Assistant Professor, Centre for Neuroscience
Old TIFR building
Indian Institute of Science
Bangalore-560012, India
Tel: +91 80 2293 3431
Fax: 080-23603323
Email: sparun@cns.iisc.ernet.in

Mani **BHAUMIK**
2085 Deer Run, Los Angeles
California, USA 90049
Tel: 001 310 4710133
Email: mlbhaumik@earthlink.net

Josep **CALL**
Senior Scientist and Director
Wolfgang Köhler Primate Research Center &
Department of Developmental and Comparative Psychology
Max Planck Institute for Evolutionary Anthropology
Deutscher Platz 6, 04103 Leipzig Sachsen
Germany
Tel: +49 341 3550 418
Fax: +49 341 3550 444
Email: call@eva.mpg.de

Gautam **CHATTERJEE**
Banaras Hindu University, Varanasi &
President, Abhinavagupta Academy
Varanasi, India
Mob: 09795178699
Email: gautam.chatterjee9@gmail.com

Benoy **CHAKRAVERTY**
Director of Research Emerite
CNRS, Grenoble, France
Email: benoy_chakraborty@hotmail.fr

Philip **CLAYTON**
Provost, Claremont Lincoln University
Vice President and Dean
Claremont School of Theology, USA
Tel: (909) 447-2521
Website: www.ClaremontLincoln.org
Email: pclayton@cst.edu

Ramanath **COWSIK**
Former Director, Indian Institute of Astrophysics and Director, McDonnell Center for the Space Sciences and Laboratory for Space Sciences and Department of Physics, CB 1105
Washington University, 1 Brookings Drive
St. Louis, MO 63130-4899, USA
Email: cowsik@wuphys.wustl.edu

Natalie **DEPRAZ**
Dept of Philosophy
University of Rouen, France
Email: natalie.depraz@freesurf.fr

Stuart **HAMEROFF**
Director, Center for Consciousness Studies,
University of Arizona, Tucson, USA
Email: hameroff@u.arizona.edu

Robert **HAMPTON**
Associate Professor
Emory University
Department of Psychology and
Yerkes National Primate Research Center
36 Eagle Row, Atlanta, GA 30322
Website: www.psychology.emory.edu/lcpc
Tel: 404-727-5853
Email: robert.hampton@emory.edu

Malavika **KAPUR**
Visiting Professor, School of Humanities
National Institute of Advanced Studies
Indian Institute of Science Campus
Bangalore 560012, India
Email: malavikakapur@yahoo.co.in

Rajesh **KASTURIRANGAN**
Associate Professor, School of Humanities
National Institute of Advanced Studies
Indian Institute of Science Campus
Bangalore 560012, India
Email: rkasturi@gmail.com

Mayank R **MEHTA**
Director, W M Keck Center for Neurophysics
& Associate Professor
Departments of Physics & Astronomy,
Neurology, Neurobiology
University of California, Los Angeles, USA
Email: mayankmehta@ucla.edu

Sangeetha **MENON**
Professor, School of Humanities
National Institute of Advanced Studies
Indian Institute of Science Campus
Bangalore 560012, India
Email: prajnana@yahoo.com
Website: consciousnessshop.com
samvada.com

Anand C **PARANJPE**
Professor Emeritus
Psychology and Humanities
Simon Fraser University
Vancouver, Canada
Email: paranjpe@sfu.ca

V S **RAMAMURTHY**
Director
National Institute of Advanced Studies
Indian Institute of Science Campus
Bangalore 560 012
Tel: 080-2360 1969
Email: vsramamurthy@nias.iisc.ernet.in

Shobini **RAO**
Professor, Department of Clinical Psychology
National Institute of Mental Health &
Neurosciences
Hosur Road, Bangalore 560029, India
Tel: 080-26995188
Email: shobini@nimhans.kar.nic.in

Sisir **ROY**
Professor, Physics and Applied Mathematics
Unit (PAMU)
Indian Statstical Institute, Kolkata
India – 700108
Tel: 03325753021,
Mob: 9836265665
Email: sisir@isical.ac.in

Nilanjana **SANYAL**
Professor, Department of Psychology
University of Calcutta
Kolkata, India
Email: sanyal_nilanjana2004@rediffmail.com

P. **SATISHCHANDRA**
Director / Vice-Chancellor
National Institute of Mental Health and
Neuro Sciences (NIMHANS)
Bangalore-560029, India
Tel: 080-26995001/5002
Email: vc@nimhans.kar.nic.in
psatish@nimhans.kar.nic.in

Anil K **SETH**
Co-Director, Sackler Centre for
Consciousness Science &
Director, Neurodynamics and Consciousness
Laboratory, School of Informatics
University of Sussex, Falmer, Brighton
BN1 9QJ, UK
Tel: +44 1273 678549,
Email: a.k.seth@sussex.ac.uk
Website: www. anilseth.com

Shridhar **SHARMA**
Past President of International Union of Psychiatry
D-127, Preet Vihar
New Delhi 110092, India
Tel: 91 11 22508749
Mob: +91 9810177743
Email: sharma.shridhar@gmail.com

Jonathan **SHEAR**
Affiliated Associate Professor of Philosophy
College of Humanities and Social Sciences
Virginia Commonwealth University
Richmond, USA
Email: jcs@infionline.net

Anindya **SINHA**
Professor, School of Natural Sciences and Engineering
National Institute of Advanced Studies
Indian Institute of Science Campus
Bangalore 560012, India
Email: anindyaranasinha@yahoo.com

B V **SREEKANTAN**
Hon. Visiting Professor,
School of Humanities
National Institute of Advanced Studies
Indian Institute of Science Campus
Bangalore 560012, India
Email: bvsreekantan@gmail.com

R **SRIKANTH**
Assistant Professor
Dept. of Theoretical Sciences
Poornaprajna Institute of Scientific Research, Bangalore- 560 080
Karnataka, India.
Mob: +91 98445 93440
Email: srik@poornaprajna.org
Website: http://ppisr.res.in/~srik

M S **THIMMAPPA**
Professor of Psychology, and
Former Vice Chancellor
Bangalore University
Bangalore, India
Email: thimmappams@gmail.com

Max **VELMANS**
Department of Psychology
Goldsmiths, University of London
New Cross, London SE14 6NW, UK
Website: www.goldsmiths.ac.uk/psychology/staff/velmans.php
Email: psa01mv@gold.ac.uk

Milind **WATVE**
Professor
Indian Institute of
Science Education and Research
Sai Trinity Building, 3rd Floor
Chemistry Wing, Sutarwadi, Pashan
Pune 411021, India
Tel: 020-25908093, *Mob:* 9822910198
Email: milind@iiserpune.ac.in

Contact Addresses of Registered Participants & Students

Varun **AGARWAL**
Bhaktivedanta Institute, RC-8
Raghunathpur, Manasi Manjil Building
VIP Road, Kolkata 700 059
Tel: 033-2500 9018
Mob: 9831691449
Email: varun.bsds@gmail.com

Shikha **AHUJA**
Student
Msc. Psychology
CMR Institute of Management Studies
#209, 3rd C Main Road, OMBR Layout
Banasvadi, Bangalore 560043, India
Mob: 9632063066
Email: shikha1990@hotmail.com

Abhishek **ANAND**
Student
Department of Life Sciences
Indian Institute of Science Education and Research (IISER) – Kolkata
Mohanpur Campus, PO: BCKV Campus Main Office, Mohanpur - 741252
Nadia, West Bengal, India
Mob: 08981693913
Email: i.abhi.myself2@gmail.com

Mythili **ANOOP**
Assistant Professor
Jain University
CMS Building, Palace Road
Bangalore 560076, India
Mob: 9379444560
Email: mythilianoop@gmail.com

S **ANUSHA**
Student
Cognitive Neuroscience Centre
Dept. of Clinical Psychology
National Institute of Mental Health and Neurosciences
Bangalore 560029, India
Mob: 9844568498
Email: anugomsy@gmail.com

R **APURVA**
Practitioner – Psychologist
Clinical Hypnotherapist, "Human Potential"
#601, 1st Cross, 30th Main Road
Banashankari, 3rd Stage, Banagirinagara
Bangalore- 560085
Mob: 9902577033
Email: apurvashekar@gmail.com

S **ASHA**
Student
Symbiosis Centre of Distance Learning, Pune
4/43, Vidyut Nagar, Dayalbagh
Agra 282005
Mob: 9259161454
Email: sasha1131@rediffmail.com

Bhavani Shankara **BAGEPALLY**
MBBS (PhD in Clinical Neuroscience)
National Institute of Mental Health And Neurosciences
Hosur Road, Bangalore, 560029, India
Mob: 9980574800
Email: bshankara@gmail.com

KN **BAIDYA**
49, 1st Cross, 9th Main
HAL III Stage, Bangalore 560 075
Tel: 080-25297660
Mob: 99005 63943

Reshma **BASAK**
Student, Indian Institute of Science Education and Research
Mohanpur Campus, PO BCKV Campus Main Office, Mohanpur 741 252, Kolkata, India
Mob: 9432688881
Email: reshma.basak@yahoo.com

Sanjib **BASU**
Director
GROUP DYNAMIX Management Training &
Organisation Development
1A, Lee Road, Kolkata 700020, India
Tel: (033) 65213681 / 65484385
Mob: 9830060440
Email: groupdynamix@gmail.com

Vijay N **BHAT**
Academician
Bangalore University
A-101, Century Park Apartments
48, Richmond Road, Bangalore 560025
Tel: 080-25559513
Email: vijaybhat1945@yahoo.com

V V **BINOY**
CSI Postdoctoral Fellow
National Instittue of Advanced Studies
Indian Institute of Science Campus
Bangalore - 560 012, India
Tel: 07829496778
Email: vvbinoy@gmail.com

Bhausaheb Rajaram **BIRADAR**
Student
Center of Behavioral and
Cognitive Sciences (CBCS)
University of Allahabad
Allahabad, India
Mob: 09833021045
Email: bhausaheb@cbcs.ac.in

Anuradha **CHOUDRY**
Centre for Indian Psychology
Jain University
No. 303, III Main, WCR, Mahalaxmipuram
Bangalore 560 086
Mob: 9880739482
Email: panditanu@gmail.com

Carla **CLARK**
Student
University of Edinburgh
Drawin Building (B.Boettcher group)
King's Buildings, Edinburgh EH93JJ
Scotland
Mob: (+44) 07789448136
Email: cclark4@staffmail.ed.ac.uk
carla.clark@ed.ac.uk

Christoph **DAHL**
Post-doctoral Student
Primate Research Institute
Kyoto University
Kanrin, Inuyama-city
Aichi 484-8506 Japan
Email: dahl@pri.kyoto-u.ac.jp

Diptaranjan **DAS**
Student
Indian Institute of Science Education and
Research-Kolkata
AX-007B, CB Raman Building IISER-Kolkata
Mohanpur Campus, P.O. BCKV Campus
Main Office, Mohanpur 741 252
West Bengal, India
Mob: 09879539499
Email: diptaranjan@gmail.com

Sayantan **DAS**
Student
Indian Institute of Science Education and
Research (IISER), IISER-Kolkata
Mohanpur Campus, Post
BCKV Campus Main Office
Kolkata 741 246, India
Mob: 09836128300 / 9663857130
Email: sayantaniiser@gmail.com
sayantan@iiserkol.ac.in

Shilpa **DATAR**
Student
Regional Institute of Education, Mysore
Sai Krupa, 19/1, Bellary Road
Sadashivanagar, Bangalore 560080, India
Mob: 98452 47815
Email: shilpamhdatar@yahoo.co.in

Shruti V **DESHMUKH**
Student
MGM's College of Engineering and Technology
Kamothe, Navi Mumbai- 401209
C/001, New Sai Park, Co-op. Society
Near Classic Furniture
Birla College Road, Kalyan (West)
Maharashtra 421 301
Mob: 8828424403 / 8087929763
Email: shrutideshmukh146@gmail.com

Deepti **DIWAKAR**
Student
233, 18th Cross, Sadashivnagar
Bangalore 560 080, India
Tel: 23610330, 2361 2064
Email: deeptidiwakar@hotmail.com

Saurav **DUTTA**
Student- Integrated M.S
Indian Institute of Science Education and Research(IISER)- Kolkata
Mohanpur Campus, P.O. B.C.K.V. Naida
Kolkata 741 252
Mob: 8013470358
Email: saurav.6664@yahoo.co.in

Soumyadeep **DUTTA**
Student
Department of Electrical and Communication Engineering,
Indian Institute of Science
Bangalore 560 012
Mob: 9482519815
Email: soumdtt2003@yahoo.com

Nalini **DWARAKANATH**
Counseling Psychologist
Centre for Counseling and Support
Indian Institute of Science
Bangalore-560012
Res. #4, 17th Cross
West Park, Malleshwaram
Bangalore – 560055, India
Mob: 9945321422
Email: nalini.bng@gmail.com

Manjusha S. **GHOSH**
Student
Indian Institute of
Science Education and Research
Mohanpur Campus, Mohanpur 741252
Dist. Nadia, West Bengal, India
Mob: 09674479454
Email: manjusha.ghosh@yahoo.com

Shreejata **GUPTA**
Doctoral Student
National Institute of Advanced Studies
Indian Institute of Science Campus
Bangalore 560012, India
Email: shreejata@gmail.com

SS **HASAN**
Director
Indian Institute of Astrophysics
Sarjapur Road, Koramangala II Block
Bangalore 560 034
Tel: 080-25530583; *Mob:* 9886090915
Email: diriia@iiap.res.in

Shantala **HEGDE**
Senior Scientific Officer,
Cognitive Psychology Unit
Center for Cognition & Human Excellence
(Dept of Clinical Psychology)
National Institute of Mental Health & Neurosciences, NIMHANS
(Deemed University)
Bangalore-560029, India
Tel: 091 80 2699 5369; *Mob:* 9448735801
Fax: 091 80 2699 48 30
Email: shantala.hegde@gmail.com

Trishtina **HEMBRAM**
Student
Indian Institute of Science Education and Research Kolkata
Mohanpur Campus, Mohanpur 741252
Dist. Nadia, West Bengal, India
Mob: 09674478825
Email: trishtih@gmail.com

Lata **HEMCHAND**
Asst. Professor
Richmond Fellowship P. G. College for
Psychological Rehabilitation
327, 15th Cross, II block, Jayanagar
Bangalore 560 011, India
Tel: (080) 26564116
Mob: 9880308572
Email: lata.hemchand@gmail.com

Sneha **HONNAPPA**
Student
(J.Kepler Institute of Astronomy
ul. Lubuska 265-265 Zielona Góra, Poland)
Raman Research Institute
C.V. Raman Avenue, Sadashivnagar
Bangalore 560080
Mob: 9740789644
Email: sneha.honnappa@gmail.com

V. Judu **ILAVARASU**
PhD Scholar, Swami Vivekananda Yoga
Anusanthana Samsthana (SVYASA)
19, Eknath Bhavan, Gavipuram Circle
K.G.Nagar, Bangalore, India. Pin:560 019.
Website: www.svyasa.org
Mob: +91 9035730812
Email: juduilavarasu@yahoo.co.in

Thomas Gregor **ISSAC**
Jr. Resident, M.D-PhD in Clinical
Neurosciences
National Institute of Mental Health And
Neurosciences
Bangalore-560029, India
Mob: 9632644712
Email: thomasgregorissac@gmail.com

Prajakta Kamalkani **JADHAV**
Student
MGM College of Engineering and Technology
1A/104, Laxmi, CHS Devaratna Nagar
S.M.Road, Sion–Chunabatti
Mumbai – 400022, India
Mob: 7738663084
Email: Angel261990@gmail.com

Vimarsha **JAIN**
Shri Dharmasthala Manjunatheswara College
P G Department of Psychology
S.D.M. College, Ujire, Belthangady
South Canara Dist, Belthangady 574 240
Mob: 09901966866
Email: Jain.vimarsha@gmail.com

Harpreet Kaur **JASS**
Student
Department of Human Development &
Family Studies
Faculty of Family of Community Sciences
MS Univ. of Baroda, Vadodra, India
Mob: 7598183413, 09811136855
Email: harpreetkaur.jass@gmail.com

J **JAYADEV**
Student
University of Calicut, Madhavam (H)
Thenchipalam-673636, Kerala, India
Mob: 9633693839
Email: jayadev.madhavam@gmail.com

Ashwin **JAYANTI**
Student
Madras Christian College
East Tambaram
Chennai 600 059
Mob: 9677200575
Email: ashwin.maverique@gmail.com

Suresh **JOIS**
Information Technology and Interactive/
Social Media consultant
Bangalore, India
Email: radiojois@gmail.com

Krutika **JOSHI**
Student, University of Toronto, Canada
Home: #301, Brigade Lavella Apts
Bangalore-560 001
Tel: 41136288
Mob: 99720 72405,
Email: ecojosh14@yahoo.co.uk

B Jyothsna **KAMATH**
UGC-Senior Research Fellow
Department of Psychology
Bangalore University
Jnanabharathi, Bangalore - 560056
Mob: 9740928405
Email: jyothsna.kamath@gmail.com

Devpriya **KUMAR**
Doctoral Student
Center of Behavioural and
Cognitive Sciences
University of Allahabad
Allahabad – 211002, India
Mob: 9956808957
Email: devpriyak@cbcs.ac.in

Namitha A **KUMAR**
Doctoral Student, School of Humanities
National Institute of Advanced Studies
Indian Institute of Science Campus
Bangalore 560012
Email: namitha29@gmail.com

V Vineeth **KUMAR**
Assistant Professor
AIBAS, Amity University, Jaipur, Rajasthan
Mob: 09829356299
Email: vvineethkumar@yahoo.co.in

Vijai **KUMAR**
MD, MRCP (London)
SA Hospital
Dayalbagh Educational Institute
Deemed University
Dayalbagh, Agra 282 110, India
Mob: 09359546630
Email: cm.markan@dei.ac.in

Mohini **LAHIRY**
Student
Dept of Molecular Reproduction
Development, and Genetics
Indian Institute of Science
LM-04, Bangalore 560012, India
Mob: 9482222662
Email: thisismohini@gmail.com

Sudarshan **LAHIRY**
GD-131, Salt Lake
Kolkata 700 106, india
Mob: 09433002625
Email: lahirysudarshan@gmail.com

K **LAKSHMI**
Doctoral Student
National Institute of Advanced Studies
Indian Institute of Science Campus
Bangalore 560012, India
Mob: +91 94499 76327
Email: 10.lakshmi@gmail.com

Zacharias **LUCAS**
Student
Edinburgh Napier University
Sighthill Campus, Sighthill Court
Edinburgh EH11 4BN, Scotland
Mob: (+44)7587504482
Email: luc_zac@hotmail.com

Lakshmi **MAHADEVAN**
University of Calicut, Kerala
'Chidambaram' 18/865
Near Tali temple, Calicut-2, Kozhikode
Mob: 09995369075
Email: Sangee0105@gmail.com

Anupama **MAHAJAN**
Mallya Aditi International School
P.O. Box. No. 6427, Yelahanka New Town
Bangalore – 560 106, India
Tel: (080) 40447000
Mob: 9535012711
Email: Anabi21@gmail.com

D **MANASA**
Shri Dharmasthala Manjunatheswara College
Lecturer
P G Department of Psychology
S.D.M. College, Ujire, Belthangady
South Canara Dist, Belthangady 574 240
Mob: 8105241741
Email: maanudharmaraj@gmail.com

Meenu Mary **MARGARET**
Student, Department of Management Studies
Indian Institute of Science
#9, IInd Cross, RRMR Extension
Bangalore 560027, India
Mob: 9880647049
Email: meenumargaret@gmail.com

C M **MARKAN**
VLSI Design Technology Lab
Dept. of Physics & Computer Science
Dayalbagh Educational Institute
(Deemed University)
Agra 282 005, India
Website: www.dei.ac.in
Mob: 09557790100
Tel: (Off) : 0562-6458483 (ext) 15
Fax: +91562-2801226
Email: cm.markan@dei.ac.in

Sonali Bhatt **MARWAHA**
41, Sea Shore Apts
Pandurangapuram Beach Road
Visakhapatnam 530 003
Andhra Pradesh, India
Mob: 91 9849235874
Email: sonalibm@gmail.com

Nitasha **MATHAYAS**
Student
Department of Physics and Astrophysics
University of Delhi
Delhi 110 009, India
Mob: 09818140904
Email: Nitasha.mathayas@gmail.com

Vineeta **MATHUR**
Dayalbagh Educational Institute
Deemed University, Dayalbagh
Agra 282005
Mob: 09719830058
Email: vineetamathur2@gmail.com

Lalitha **MATTHEW**
C.5, Hulkul Residency
81, Lavelle Road
Bangalore–56000, India
Tel: 9448374349
Email: lalikoch@gmail.com

Eric **MCDERMOTT**
US Fulbright-Nehru Research Fellow
National Institute of Mental Health & Neuro Sciences (NIMHANS)
Hosur Road, Bangalore - 29
Mob: 9538088427
Email: ericjamesmcdermott@gmail.com

Pragyanparamita **MOHAPATRA**
Research Scholar
Godavari Hostel, Room No. 253
Jawaharlal Nehru University
New Delhi-110067, India
Mob: 9971522815
Email: upragyanparamita@gmail.com

Sonali **MOHAPATRA**
Student
Indian Institute of
Science Education and Research
Kolkata
Email: shine.shons@gmail.com

Geethanjali **MONTO**
Science Correspondent
Current Science Association
C V Raman Avenue, P.B. 8001
Bangalore- 560080, India
Tel: 080-2361 2310

Makwana **MUKESH**
Student
Centre of Behavioural and Cognitive Sciences (CBCS)
Senate Hall Campus, University of Allahabad
Allahabad – 211002, India
Mob: 09956612881
Email: mukesh@cbcs.ac.in

Atreyee **MUKHERJEE**
West Bengal State University
Res: 85/1/4 Ibrahimpur Road
Kolkata 700032, India

Tel: 033-24837127
Mob: 09051642977
Email: Atreyee76@yahoo.com

V Suryanarayana **MUMMIDI**
Student
Centre for High Energy Physics
Indian Institute of Science
Bangalore 560012, India
Mob: 9686232598
Email: soori9@gmail.com

Malini **MUNDLE**
Counseling Psychologist
DI, 3rd Floor, Casa Augusta Apartments
68, Curley Street, Richmond Town
Bangalore 560 025
Mob: 9611106990
Email: malini_50@hotmail.com

D Satya **MURTHY**
IAS, Principal Secretary to Government
Water Resources Department
Karnataka Government Secretariat
Room No. 306, Vikasa Soudha
Bangalore – 560 001, India
Tel: 080-22257064
Mob: 98440-94089
Email: prswrdoffice@gmail.com
satyamurtyd@gmail.com

Niranjan **MURTHY**
Assistant Professor
Sri Siddhartha Medical College
Agalkote, Tumkur, Karnataka
Tel: 080-23231405
Mob: 09480703262
Email: nirilib@yahoo.co.in

Ajay Kumar **NAIR**
Student, Department of Neurophysiology
National Institute of Mental Health And
Neurosciences, Hosur Road
Bangalore – 560029, India
Mob: 9845189767
Email: Ajay.nimhans@gmail.com

Indrajith R **NAIR**
Student
Cochin University of Science & Technology
Edappilly (H), P.O. Manakkody
Thrissur 680017, Kerala, India
Mob: 09744704575
Email: indrajith007@gmail.com

P Hasna **NAJATH**
Department of Psychology
Delhi University
102, H-1, Power Enterprises
Masjid 64 Khamba, Mirdard Lane
Behind G.B. Pant Hospital
New Delhi – 110002, India
Mob: 09311701666
Email: himusdidi@gmail.com

R N **NARAHARI**
Centre for Nano Science and Engineering
Indian Institute of Science
Bangalore 560012, India
Tel: 2360 4656; *Mob:* 9845257928
Email: narahari.rn@gmail.com
narahari@cense.iisc.ernet.in

Roopa Hulikal **NARAYAN**
APL Global School
C-34, Brook Arihant Escapade
48 Devaraj Nagar, Thuraipakkam
Chennai – 600097, India
Mob: 9003209611
Email: roopahulikal@yahoo.com

R Karthick **NARAYANAN**
Room No. 264, Kaveri Hostel
Jawaharlal Nehru University Campus
New Delhi 110 067, India
Mob: 09873860386
Email: karthick1988.nara@gmail.com

Chetan Sateesh **NAYAK**
Student
National Institute of Mental Health and
Neurosciences, Bangalore 560029, India
Mob: 9480829636/9980035645
Email: chetu_nayak@yahoo.co.in

Gagandeep **NIGAM**
Manipal University
H.N-2, Rajdeep Enclave Phase II
Dayalbagh, Agra-282005, India
Mob: 09719111311, 09999500372
Email: gagandeepnigam@yahoo.com

Anustuv **PAL**
Student Dept. of Physics
Hostel NHC, Room ZT44
Indian Institute of Science
Bangalore 560012, India
Mob: 9483709887
Email: anustuv@gmail.com

Manoj Kumar **PANDA**
PhD. student
Centre for Philosophy
School of Social Sciences
Jawaharlal Nehru University
New Delhi, 110067, India
Mob: 08010819069
Email: mpanda84@gmail.com

Rajanikant **PANDA**
Student
EEG-Technician, Cognitive Neuroscience
Centre, Dept. of Clinical Psychology
National Institute of Mental Health and
Neurosciences
Bangalore 560029, India
Mob: 9902509994
Email: bk.bme.rajanikant@gmail.com

Shilpa Ashok **PANDIT**
Independent Researcher
D-2, Seapoint Annexe
29/4, Beach Road
Kalakshetra Colony
Besant Nagar
Chennai- 600090, India
Mob: 09962269944

Pravesh **PAREKH**
Student of Integrated M.Tech
Biotechnology
Amity University of Biotechnology
Room No. 211, Hostel-2
Amity Boys Hostels
Amity Univ. Sector 125
Noida 201303, UP, India
Mob: 09560021040
Email: praveshparekh@gmail.com

Bharathi **PRABHU**
140-Y, 17th C Main 51st cross
3rd Block, Rajajinagar
Bangalore, India
Tel: 23382951, *Mob:* 98860 82590
Email: prabhu.bharathi@gmail.com

M V **PRABHUDEV**
M Sc integrated in Biological Sciences
Bangalore University
Bangalore, India
Email: prabhudevmv@gmail.com

Shiroman **PRAKASH**
Student
Dept. of Theoretical Physics
Tata Institute of Fundamental Research
Colaba, 400005, Mumbai, India
Mob: 9969608418
Email: shiroman@tifr.res.in

G **PURUSHOTHAMA**
(Visiting Professor,
Dr. S.R. Chandrshekhar Institute of
Speech and Hearing)
Managing Director
Whisper Hearing Aids Pvt. Ltd.
949, 24th Main, 39th Cross
4th T Block, Jayanagar
Bangalore 560 041
Tel: 080-26640571; *Mob:* 9483534754
Email: dr.g.purushothama@gmail.com

L **RAGHAVENDRA**
15/A, 37th Cross, 8th Block,
Jayanagar, Bangalore 560070, India
Mob: 9845003978
Email: work.lr@gmail.com,
raghavendra@rocketmail.com

K **RAJAKUMARI**
Researcher
Cognitive Neuroscience Centre
Ashwini Block, National Institute of Mental Health and Neurosciences
Hosur Road, Bangalore 560029, India
Tel: 080-26995454
Mob: 9945193227
Email: rajkumari.pampa@gmail.com

Balachandar **RAKESH**
PhD scholar in Clinical Neurosciences
Department of Psychiatry
National Institute of Mental Health and Neurosciences
Hosur Road, Bangalore 560029, India
Mob: 9535228260
Email: balachandar.rakesh@gmail.com

Bhargavi **RAMANUJAM**
Student
Dept. of Clinical Psychology
Cognitive Psychology Unit
National Institute of Mental Health and NeuroSciences (NIMHANS)
Bangalore -560029, India
82 East Park Road
Home address:
Between 10th & 11th Cross, Malleswaram
Bangalore 560 003, India
Mob: 9886838271
Email: bhargavi85@gmail.com

Dharitri **RAMAPRASAD**
Richmond Fellowship P. G. College for Psychological Rehabilitation
40-1/4, 6th Cross, Vajpeyam Gardens
Ashoknagar, BSK I Stage
Bangalore – 560050, India
Tel: 26676134, *Mob:* 94482 58854
Email: dharitri_r@yahoo.co.in

M Taraka **RAMJI**
Int. PhD – Student
Indian Institute of Science Education and Research-Kolkata
A-212, APC Roy Boys Hostel, Mohanpur
Nadia District IISER
Kolkata 741 252, India
Mob: 09679773808
Email: moturu1103@iiserkol.ac.in

K. Vasudeva **RAO**
Bhaktivedanta Institute, RC-8
Raghunathpur
Manasi Manjil Building, VIP Road
Kolkata 700 059
Tel: 033-2500 9018
Mob: 9432429660
Email: kvr.aissq@gmail.com

Veena **RAO**
Hon. Research Associate
School of Humanities
National Institute of Advanced Studies
Indian Institute of Science Campus
Bangalore 560012, India

Parul **RATHORE**
Student
CMR Institute of Management Studies
#209, OMB Layout, Bhuvangiri
Banaswadi, CMR Law College
Bangalore 560043, India
Mob: 7411128931
Email: rathore.parul7@gmail.com

Sukanya **RAY**
Human Dynamic Centre
#B 3095, Sobha Sunscape, 8/1
Manavarthakaval Village, Uttarahalli Hobli
Kanakpura Main Road
Bangalore – 560062, India
Tel: 28424237; *Mob:* 9901575165
Email: sukanya.ray7@gmail.com

Sumantran **RAY**
Student
Girindra Sekhar Institute of Psychological Education and Research
DL-45, Sector-2 Salt Lake City
Kolkata 700 091, West Bengal, India
Mob: 09874698823, 08902634106

K Jayashankar **REDDY**
Principal, Professsor, and Head of
Department of Psychology
CMRCentre for Management Studies
No. 5, Bhuvanagiri, OMBR Layout
Banasawadi, Bangalore – 560 043, India
Mob: 9845120091
Email: jayashankarblr@gmail.com

Sukhdev **ROY**
Associate Professor
Department of Physics and Computer Science
Dayalbagh Educational Institute
Dayalbagh, Agra 282 110, India
Tel: +91-562-2801545
Fax: +91-562-2801226
Email: sukhdevroy@gmail.com

Murli **SALETORE**
107, Chitrapur Housing Society
68, 15th Cross, Malleswaram
Bangalore 560055
Tel: 2334 8986
Mob: 98441 28932
Email: msaletore@hotmail.com

Nagashree **SANTOSH**
Student
Dept. of Clinical Psychology
Cognitive Psychology Unit
National Institute of Mental Health and NeuroSciences (NIMHANS)
Bangalore - 560029, India
Res. #3, Anugraha Layout
Kudichikkana Halli
Begur Hobli, Bangalore 570076, India
Mob: 9901751387
Email: shreerose2005@gmail.com

Lalit **SARASWAT**
Sharda Group of Institutions
Hindustan College of Science and Technology
Farah, Mathura – 291122, India
Mob: 8126367805
Email: lalit.bio@gmail.com

Ranjeet Kaur **SATSANGI**
Professor
Dayalbagh Eduational Institute
Dayalbagh, 2/123
Karyaveer Nagar
Dayalbagh, Agra 282005, India
Mob: 09259207346
Email: ranjeetkaurdei@gmail.com

Sunita **SATSANGI**
Facilitator
Dayalbagh Educational Institutes
(Deemed University), Dayalbagh
37B/205, Sant Nagar, Nagla Hawali
Dayalbagh, Agra 282005, India
Mob: 09457002925, 09412626615
Email: sunitasatsangi1234@gmail.com

Anirudh **SATTIRAJU**
Student
Amity University of Biotechnology
Room No. G11, Amity Boys Hostel-1
Amity University. Sector 125
Noida 201303, UP, India
Mob: 08800372717
Email: 7.anirudh@gmail.com

SAUMITRA
Student
Centre for Nano Science and Engineering
JUH-203, Jawahar Visitor House
Near Gymkhana
Indian Institute of Science
Bangalore 560012, India
Mob: 9611185497
Email: saumitra1989@gmail.com

A.J. **SHAMBHU**
Student
Department of Psychology
Delhi University
Room No. 212, Manasarovar Hostel
University of Delhi
New Delhi – 110007, India
Mob: 08285179607
Email: beingshambhu@gmail.com

R **SHARATHCHANDRA**
Student - Research Associate
Cognitive Neuroscience Centre
National Institute of Mental Health and
NeuroSciences (NIMHANS)
Bangalore 560029, India
Email: looplogic@gmail.com

Sakshi **SHARDA**
Student
Indian Institute of Science Education and
Research – Kolkata
F702, Waterfront
Kalyani Nagar, Pune 411006, India
Mob: 9881609884

Himanshu **SHARMA**
Undergraduate Student
Dept. of Electronics and Communication
Netaji Subhas Institute of Technology
Delhi University
717 / Sector 8, R.K. Puram
New Delhi – 110022, India
Mob: +91-9711680356
Email: himanshu.ecko@gmail.com

Mamta **SHARMA**
Asst. Professor, Department of Psychology
Punjabi University
Patiala-147002 (Punjab), India
Mob: 09538555222
Email: mamtaagnihotri@sify.com

Pooja **SHIRSAT**
Student
Mahatma Gandhi Mission College of
Engineering & Technology
Flat No. 6, Bldg-11 'A"
Vishnu Park, Opp. Viva College
Virat (West) 401 303, India
Mob: 08080661918
Email: Intel_pooja126@yahoo.co.in
pooja.sirsat@gmail.com

Neha **SHIVHARE**
Asst. Professor
Department of Pedagogical Sciences
Faculty of Education,
Dayalbagh Educational Institute
Deemed University
Agra-282005, India
Tel: 09359285172
Email: nehashivhare1@gmail.com

Ankur **SHRINGI**
Student
Indian Institute of Science Education and
Research Kolkata
Mohanpur Campus, Mohanpur 741252
Dist. Nadia, West Bengal, India
Mob: 09748181340
Email: ankurshringi@iiserkol.ac.in

C B **SINDHUJA**
Indian Institute of Science
#24/2, 2nd Main, 3rd Cross
Chamrajpet, Bangalore 560018, India
Mob: 9916171663
Email: Sindhuja.kumari@gmail.com

Amrendra Pratap **SINGH**
Doctoral Student
Department of Science and
Technology-Junior Research Fellow
Centre of Behavioural And
Cognitive Science (CBCS)
University Of Allahabad,
Allahabad – 211002, India
Mob: 9415174778
Email: amrendra.singh@cbcs.ac.in

Dweep Chand **SINGH**
Amity Institute of Behavioral Health and
Allied Sciences
II Floor, C-block
Amity University Campus, Sector-125
Noida 201303, India
Mob: 0 9891424656
Email: drdweepsingh@gmail.com

Gopal **SINGH**
Student
Asha Foundation
Indiranagar II Stage, Bangalore, India
Tel: 8197834961
Email: gopalsingh_00@yahoo.co.in

R K **SONY**
Student
Kerala Forest Research Institute, Peechi
Thrissur 680653, Kerala, India
Mob: 09544151580
Email: sonypadichal@gmail.com

Divya **SUBRAMANIAN**
Student, (Cornell University)
101 Plaza Angelina, St. Anthony Rd.
Chembur, Mumbai
Email: ds627@cornell.edu

Prem Sewak **SUDHISH**
Department of Physics and
Computer Science
Dayalbagh Educational Institute
Dayalbagh, Agra 282 110, India
Tel: +91-562-654-7736
Email: pss@alumni.stanford.edu

Geetika **TANKHA**
Assistant Professor
AIBAS, Amity University
Jaipur, Rajasthan
Address:
G-2 Aashiyana Residency
19 Krishna Nagar, Vaishali Nagar
Jaipur 302 021, Rajasthan
Tel: 0141-2352687
Mob: 09783566363
Email: geetika21@gmail.com

A **THAMODARAN**
Student
Dept. of Clinical Psychology
Cognitive Psychology Unit
National Institute of Mental Health and
Neurosciences
Hosur Road, Bangalore – 560029, India
Tel: 080-2699 5454
Email: thamodaran@gmail.com

Antony **THOMAS**
Board Certified Behavior Analyst (USA)
Registered Psychologist (New Zealand)
Ministry of Education-Special Education
PO Box -774, Ken Browne Drive
Hamilton 3240, New Zealand
Tel: +64 7 850 8944
Fax: +647 850 8998
Email: thomas.antony@minedu.govt.nz

Immanuel **THOMAS**
Professor
Department of Psychology
University of Kerala, India
Mob: 09447694452
Email: immanuelthomas@gmail.com

Susan **THOMAS**
Student
Post Doctoral Fellow
Cognitive Neuroscience Centre
Dept of Clinical Psychology
National Institute of Mental Health and
Neurosciences
Bangalore- 560029, India
Mob: 9900315519
Email: susansusmi@gmail.com

Rekha S. **VARRIER**
Integrated Ph.D student
National Brain Research Centre (NBRC)
NH-8, Manesar, Gurgaon
Haryana - 122 050, India
Email: rekha@nbrc.ac.in

B **VENKATRAMANA**
Student
Institute for Distance Education
Madras University
Address: Shankarankad (House)
Kolathur (PO) Chengala (Via)
Kasargod (Dist.)

Kasargod – 671541, Kerala, India
Mob: +91 7204909450
Email: venkatgrf@gmail.com

Y. **VENUGOPAL**
Blind People's Association
Jagadish Patel Chowk, Surdar Marg
Vastrapur, Ahmedabad 380015
F306, Shrinandhagar-2
Vejalpur, Ahmedabad-380015, India
Mob: 09909005369
Email: venuiop@gmail.com

Eby **VERGHESE**
Student
Madras Christian College
East Tambaram, Chennai 600 059
Mob: 9884251355
Email: eby.varghese@live.com

Shubhra **VERMA**
Student
B.E Biotechnology
MGM's College of Engineering and Technology
Navi Mumbai, 1303/04,
Magnolia, Adhiraj Gardens
Sector-5 Kharghar
Navi Mumbai – 410210, India
Mob: +91 9930768095
Email: shubhra.v8@gmail.com

Maruti Mishra **VIJAYSHANKAR**
Research Scholar
Centre of Behavioural and Cognitive Sciences
University of Allahabad
Allahabad, India
Tel: 053222460738
Mob: 09794317788
Email: maruti@cbcs.ac.in
maruti.mishra07@gmail.com

BK **VINAYACHANDRA**
Centre for Indian Psychology
Jain University,
No. 303, III Main, WCR
Mahalaxmipuram,
Bangalore 560086
Mob: 9880193872
Email: aurovinaya@gmail.com

Abhinav **YADAV**
KVPY Fellow
Indian Institute of Science Education and Research
Mohanpur Campus
PO BCKV Campus Main Office
Mohanpur 741 252
Kolkata, India
Email: abhi.cho2@gmail.com



About CULTURAL PROGRAMME

Kalidasa's Kumara-Sambhavam

Presented by Khechara Academy of Dance

6.30 PM, 7th January 2012

JRD Tata Auditorium
National Institute of Advanced Studies

Concept and Choreography by Shridhar
& performed by SHRIDHARS'

Synopsis:

Kumarasambhavam, one of the greatest works of Kalidasa, captures the confluence of eroticism and asceticism in Lord Shiva through a narrative that deals with the marriage of Parvathy to Lord Shiva depicting the union of the atma with the Paramatma and the birth of Kumara. After the death of Dakshayini, Parvathy is reborn and falls in love with the Lord and unable to win Him through her physical beauty she keeps severe penance. Pleased by the devotion, Shiva appears before Parvathy and accepts her as His consort.

Summary of Scenes:

Mahakavi Kalidasa's
KUMARA SAMBHAVAM

SCENE-1

The Himalaya Mountains stand majestically in the northern part of India, and are a source of great wealth. The charismatic *Himavantha* is the king of Himalayas and is married to Mena Devi.

Dakshayani, wife of Lord Shiva, comes to witness the *Yaga* ceremony performed by her father *Daksha*. However, *Daksha* ignores her and insults and abuses Lord Shiva. Unable to bear the humiliation *Dakshayani* burns herself in fire.

SCENE-2

Parvathy is reborn as *Himavantha's* daughter. The nature and gods too rejoice the birth of *Parvathy*. She blossoms into a beautiful young woman. She is drawn towards Lord Shiva and desires to marry Him.

SCENE-3

Lord Shiva grieving over the loss of his beloved wife, *Dakshayani* comes to Himalayas and enters into deep penance. *Himavantha* comes to Shiva with *Parvathy* and requests Him to allow young *Parvathy* to wait upon Him. Shiva agrees. Parvathy serves Shiva by collecting flowers, fetching water and cleaning the altar every day.

SCENE-4

Gods who are harassed by the demon king *Taraka* learn from Brahma that the only person who can slain *Taraka* is the son of Shiva and *Parvathy*. *Indra,* the king of the gods, assigns Manmatha to induce passion in the anchorite Shiva and thereby marry *Parvathy*.

SCENE-5

Assigned by the gods *Manmatha* comes with his consort *Rathi* and infuses desire into the environs. *Manmatha* shoots arrow of desire on the Lord and hit by it He flutters. Quickly regaining His poise spots *Manmatha*. Enraged, Shiva opens his third eye and reduces *Manmatha* to ashes and leaves. *Parvathy* is shocked and forlorn that her desire to marry Shiva can no longer be realised.

Parvathy realises that she cannot win the Lord by her physical beauty but only by devotion and *Samadhi* and therefore she decides to keep severe penance and goes to the forest with her companion. She seeks the permission of her parents and leaves for the Himalayas.

SCENE-6

Parvathy continues mortifying the flesh by austerities. Days and months thus pass by. Shiva pleased with her penance decides to test her resolve. He appears before her in the garb of a young ascetic. He cajoles her saying “how could you, born in the family of the Lord Brahma, fall in love with a three eyed mendicant; He who has no parentage; no place to live; and wears snakes as ornaments and the skin of an elephant?” *Parvathy* angered by this says, “You are incapable of understanding the greatness and power of Shiva, the Lord of the Universe. Even the gods wait for his grace”. Saying so she asks him to go away. Pleased by the devotion, Shiva appears before *Parvathy* and accepts her as His consort.

Composed by Mahakavi Kalidasa
Music composed by late Smt. Jahnavi Jayaprakash
Orchestration by Vid.Anoor Anantakrishna Sharma
Conceived & Choreographed by Shridhars’

Biography of Karnataka Kalasri Shridhar & Anuradha Shridhar

Performers, choreographers, scholars-**Shridhar** and **Anuradha Shridhar** have emerged as *dancers par excellence* in Bharatanatyam today. They have enthralled the audience all over the world with their astounding technical virtuosity and emotional intensity. Trained by eminent gurus from Kalakshetra, Chennai, the couple have individuated themselves by their stunning coordination, impeccable nritta, and deeply moving abhinayam. Their choreography is fresh, remarkably creative, imbued with deep spiritual overtones and reflect extensive research. Insatiable passion towards the art and fierce dedication has placed them among the foremost dancers in the country today.

Without compromising the essential aesthetics of Bharatanatyam, Shridhars' have with great dexterity, depth of understanding, woven into the fabric of their dance, episodes from epics and great literary works that highlight human emotional conflicts. Their dance features like the Ramayana, Mahabharatam, Mahaveera Karna, Kumarasambhavam, Bharata Shapatham, Samyak Jnanam, Karntaka Vaggeya Vaibhava, Dhritarashtra Vilapam, Nathicharavaha etc., have received international acclaim.

Shridhars' have performed in most of the prestigious Sabhas in India like the Madras Music Academy, Sri Krishna Gana Sabha, Narada Gana Sabha, Karthik Fine Arts, Bharat Kalachar –all in Chennai, and in festivals like the Soorya, Sangith Natak Academy, Dharani, Thaalam, Hampi, Kinkini, Nitya Nritya, etc.

Shridhars' have received high accolades for their performances in USA, France, Germany, Switzerland, UK, Singapore, Sri Lanka, Kenya, and the Gulf countries.

Shridhar is currently pursuing his D.Lit in dance at the Hampi University. To pass on the rich legacy, they have received from great gurus, they have established "Khechara Academy of Bharatanatyam". Here they train disciples in the achievement of true classical excellence.

Many awards have been received by Shridhar:Rajyotsava Award from the Govt. of Karnataka-(2002). Karnataka Sangita Nritya Academy Award from the Govt of Karnataka-(2007), Best Actor Award from the Govt of Karnataka for his performance as the Saint Poet Shareef in the Kannada film "Santha Shishunala Shareefa" (1989-90), Senior Dancer's Award from Narada Gana Sabha, Chennai-(2009), Best Performance in the Season Award from Sri Krishna Gana Sabha, Chennai (2008), Yuva Kalabharathy from Bharat Kalachar, Chennai (2001), Karnataka Chetana from Karnataka Journalists Forum-(2000), Nrutyakalabhushana from Aryabhatta Cultural Organization (1996), Z-Essel Culture Award from Z-Kannada Tele Channel-(2007), FM Radio & E-TV Award –(2011), Hamsa Ratna Award from Hamsajyothi organization–(2011), and Chandramma Sagar Award from Rangasri cultural organization-(2011).

Contact:

Shridhar & Anuradha Shridhar

Khechara Academy of Bharatanatyam

No. 22, 3rd main, Maruthi Nagar, J.P. Nagar 7th Phase, Bengaluru - 560078

Website: www.khechara.com; Email: Shridhar_anu@yahoo.com; Tel: 080-26851133


Conference
PROGRAMME SCHEDULE

LOOKING WITHIN: INTERDISCIPLINARY APPROACHES TO CONSCIOUSNESS

International Conference
National Institute of Advanced Studies, Bangalore, INDIA

JRD Tata Auditorium
5-7 January 2012

CONFERENCE PROGRAMME

Thursday, 5th January 2012

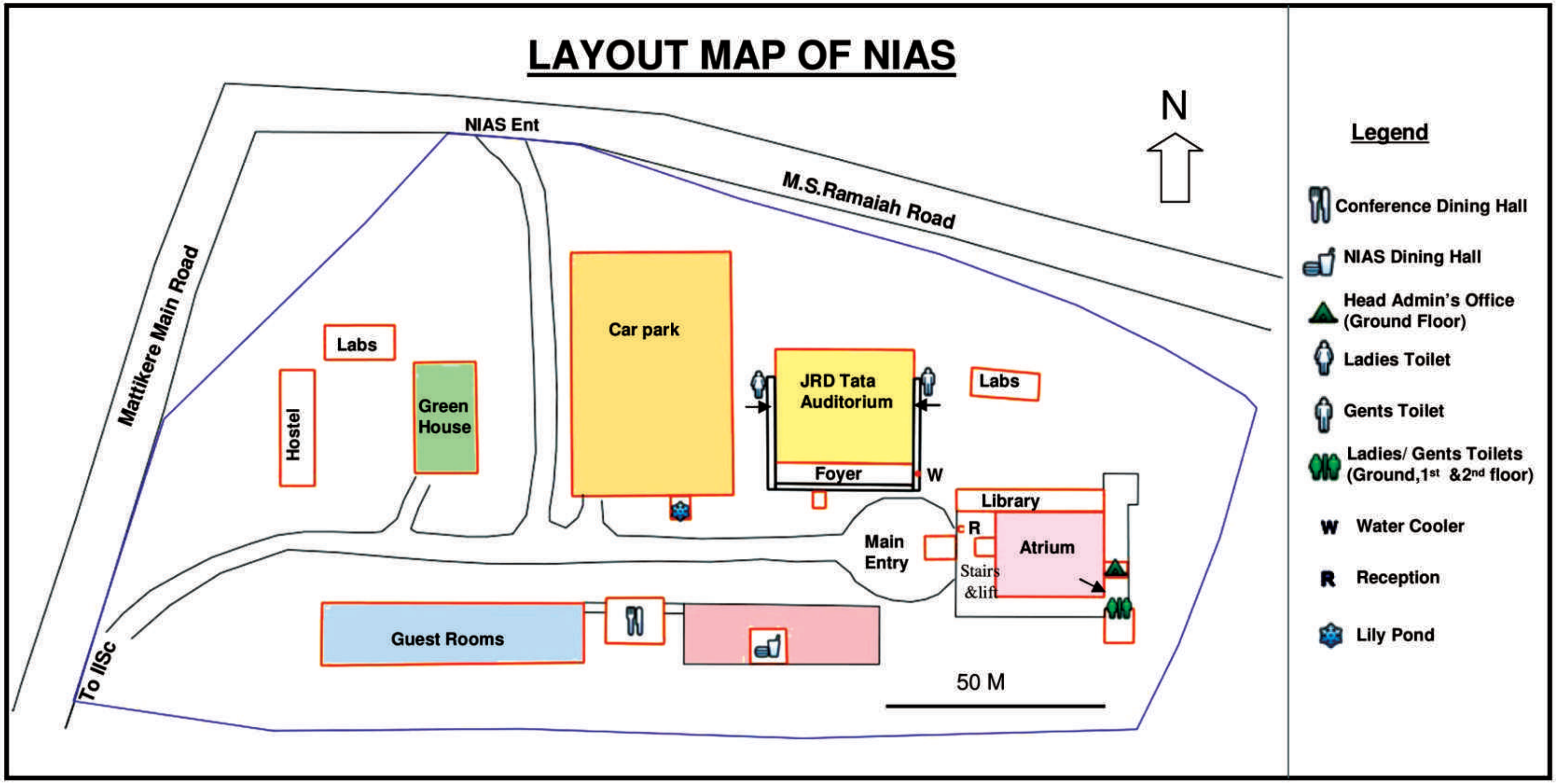
Day's Focus Theme:
Neurophysics, Quantum Mechanics and Consciousness
Concept: BV Sreekantan

TIME	EVENT	TOPIC & SPEAKER
8.00–9.00 AM	REGISTRATION	
9.00–9.50	Inaugural Session	
	9.00–9.10	*Introduction:* Sangeetha Menon
	9.10–9.20	*Welcome:* VS Ramamurthy, Director, NIAS
	9.20–9.50	*Inaugural Address:* Satish Chandra, Director & Vice Chancellor National Institute of Mental Health and Neurosciences, Bangalore
9.50–10.20		**TEA/COFFEE**
10.20–10.25	Introduction to Day's Focus Theme	BV Sreekantan
10.25–11.35	Session 1	
Chairperson: Mani Bhaumik	10.25–10.55	***Consciousness and the Universe: Current Status of the Penrose-Hameroff Orch OR Theory*** Stuart Hameroff (Video)
	10.55–11.25	***Is Brain in a Coherent State?*** Benoy Chakraverty
	11.25–11.35	Discussion
11.35–12.55	Session 2	
Chairperson: Benoy Chakraverty	11.35–12.05	***Mirroring Advaita Vedanta with Cognitive Neuroscience*** Shobini Rao
	12.05–12.15	Discussion
	12.15–12.45	***Neurophysics of Consciousness*** Mayank Mehta
	12.45–12.55	Discussion
12.55–1.45 PM		**LUNCH**
1.45–3.05	Session 3	
Chairperson: Mayank Mehta	1.45–2.15	***Functional Geometry, Internal Representation and Consciousness*** Sisir Roy
	2.15–2.25	Discussion

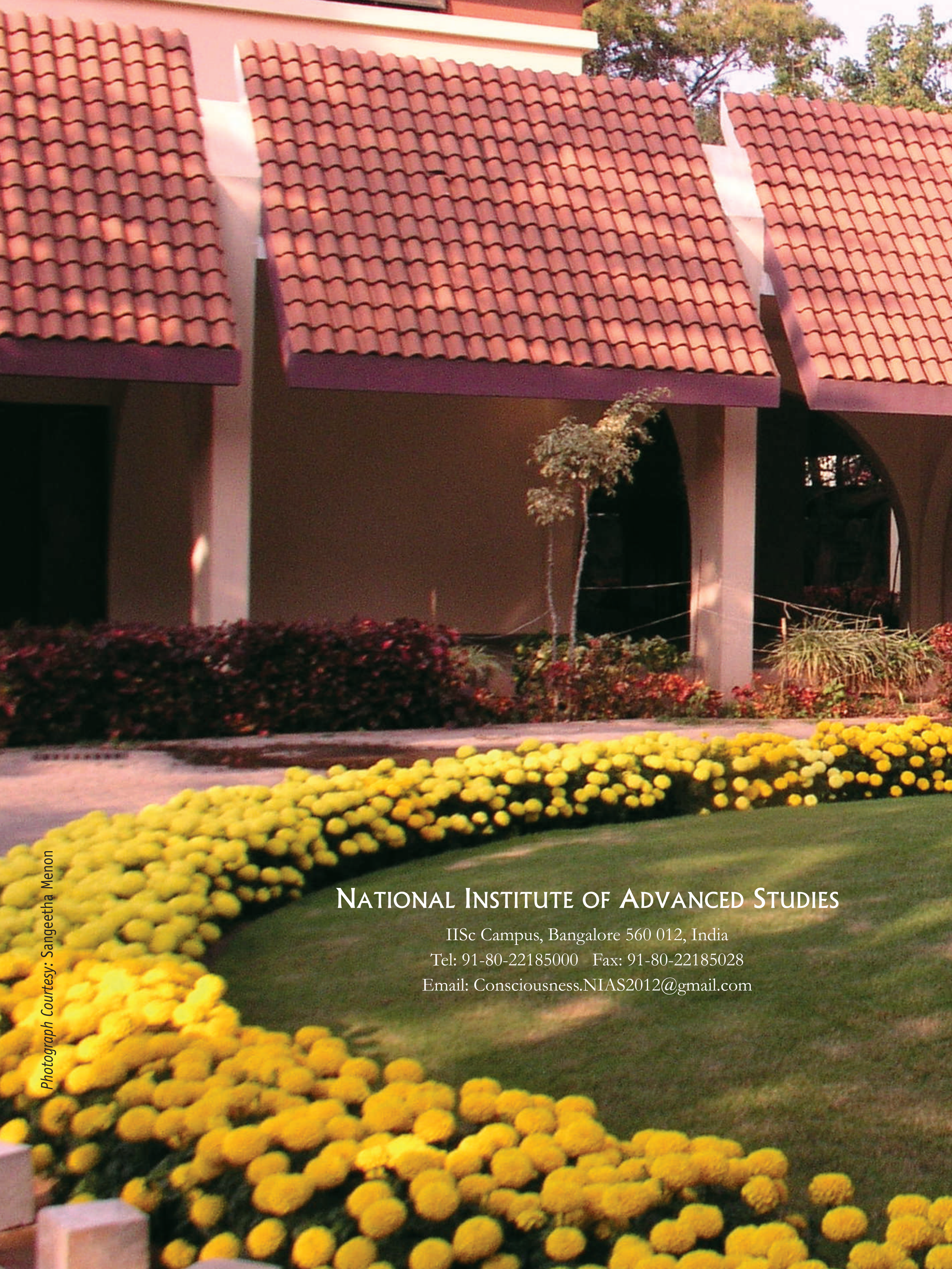
	2.25–2.55 2.55–3.05	***Libertarian Freewill and Quantum Randomness*** R Srikanth Discussion
3.05–3.30		**TEA/COFFEE**
3.30–5.45 Chairperson: BV Sreekantan	Session 4 Discussion 3.30–4.00 4.00–4.30 4.30–5.00 5.00–5.45	Theme: Physics, Cosmology and Consciousness ***Is the Source of Awareness Present in the Quantum Vacuum?*** Mani Bhaumik ***Cosmological Considerations Relevant to the Origin of Consciousness*** Ramanath Cowsik ***Is "Vaccum Quantum Biology" the Future of Life Sciences?*** B V Sreekantan Discussion
5.45–6.30 Poster Session Coordinator: Maithreyi R	Session 5	**Poster Presentations** (with TEA/COFFEE) Venue: Atrium, Faculty Building
Friday, 6th January 2012		Day's Focus Theme: *Cognition to Consciousness, Animals to Humans* Concept: Anindya Sinha
TIME	**EVENT**	**TOPIC & SPEAKERS**
8.50–9.00 AM	Introduction to Day's Focus Theme	Anindya Sinha
9.00–10.30 Chairperson: Robert Hampton	Session 1 9.00–9.30 9.30–9.45 9.45–10.15 10.15–10.30	 ***Consciousness in Humans and Other Animals*** Anil K Seth Discussion ***Is There Something Uniquely Human? Theory of Mind and Other Issues*** Milind G Watve Discussion
10.30–11.00		**TEA/COFFEE**
11.00–12.30 Chairperson: Milind G Watve	Session 2 11.00–11.30 11.30–11.45 11.45–12.15 12.15–12.30	 ***Metacognition and Memory Systems in Primates*** Robert Hampton Discussion ***Ape Metacognition: Challenges and Progress*** Josep Call Discussion
12.30–1.30 PM		**LUNCH**

1.30–3.45	Session 3	
Chairperson: Josep Call	1.30–2.00	***Social Recognition in Nonhuman Primates*** Ikuma Adachi
	2.00–2.15	Discussion
	2.15–2.45	***Can Computers Pass the Turing Test for Vision?*** S P Arun
	2.45–3.00	Discussion
	3.00–3.30	***Consciousness, Memory and Dreams in Kashyapa Samhita*** Malavika Kapur
	3.30–3.45	Discussion
3.45–4.15		**TEA/COFFEE**
4.15–5.00	Session 4	
	4.15–4.45	***The Enselved Mind*** Rajesh Kasturirangan
	4.45–5.00	Discussion
5.00–5.30 Chairperson: Anindya Sinha & Rajesh Kasturirangan	Session 5 Discussion	Theme: Cognition to Consciousness, Animals to Humans
5.30–6.30 Poster Session Coordinator: Maithreyi R	Session 6	**Poster Presentations** (with TEA/COFFEE) Venue: Atrium, Faculty Building
Saturday, 7th January 2012		Day's Focus theme: *Self in Neuropsychiatry, Neurophenomenology and Neurophilosophy* Concept: Sangeetha Menon
TIME	**EVENT**	**TOPIC & SPEAKERS**
9.00–9.10 AM	Introduction to Day's Focus Theme	Sangeetha Menon
9.10–10.40	Session 1	
Chairperson: Philip Clayton	9.10–9.40	***Finding the Self and losing the ego in the Fourth State of Consciousness*** Anand Paranjpe
	9.40–9.55	Discussion
	9.55–10.25	***What about a First Person Phenomenology? First steps towards an Experiential phenomenological Writing and Reading (EWR)*** Natalie Depraz
	10.25–10.40	Discussion
10.40–11.00		**TEA/COFFEE**

11.00–12.30	Session 2	
Chairperson: M.S. Thimappa	11.00–11.30	***The Inside-Outside Story of Consciousness: A Phenomenological Reflection*** Nilanjana Sanyal
	11.30–11.45	Discussion
	11.45–12.15	***Who's in Charge?*** Max Velmans
	12.15–12.30	Discussion
12.30–1.30 PM		**LUNCH**
1.30–3.45	Session 3	
Chairperson: Anand Paranjpe	1.30–2.00	***Converging on the Self: Western philosophy, Eastern meditation and Scientific research*** Jonathan Shear
	2.00–2.15	Discussion
	2.15–2.45	***Identity and Culture*** Shridhar Sharma
	2.45–3.00	Discussion
	3.00–3.30	***Self as Creative Freedom in Kashmir Shaivism*** Gautam Chatterjee
	3.30–3.45	Discussion
3.45–4.10		**TEA/COFFEE**
4.10–4.55	Session 4	
Chairperson: Max Velmans	4.10–4.40	***Neurophenomenology as Key to the Emergent Self: How 'Spiritual' Experiences Augment the Neuroscientific Perspective*** Philip Clayton
	4.40–4.55	Discussion
4.55–5.45 Chairperson: Philip Clayton	Session 5 Discussion	Theme: ***Self and its Wellbeing*** Panelists: Natalie Depraz, Anand Paranjpe, Nilanjana Sanyal, Immanuel Thomas, Sangeetha Menon
	5.20 – 5.45	Discussion
5.45–6.00	Concluding Session	
Chairperson: Sangeetha Menon	5.45–5.55	*Best Poster* prize ceremony
	5.55–6.00	Vote of Thanks
6.00–6.30		**TEA/COFFEE**
6.30–8.00	Bharatanatyam Dance Recital	***Mahakavi Kalidasa's Kumara-sambhavam*** Khechara Academy of Dance Artistes: Shridhar and Anuradha Shridhar



Courtesy: N.S. Nalini, NIAS



Photograph Courtesy: Sangeetha Menon

NATIONAL INSTITUTE OF ADVANCED STUDIES

IISc Campus, Bangalore 560 012, India

Tel: 91-80-22185000 Fax: 91-80-22185028

Email: Consciousness.NIAS2012@gmail.com